

# CRS Report for Congress

## Coast Guard Deepwater Program: Background, Oversight Issues, and Options for Congress

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Ronald O'Rourke  
Specialist in National Defense  
Foreign Affairs, Defense, and Trade Division



Prepared for Members and  
Committees of Congress

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# Coast Guard Deepwater Program: Background, Oversight Issues, and Options for Congress

## Summary

The Integrated Deepwater Systems (IDS) program, or Deepwater program for short, is a \$24-billion, 25-year project to replace and modernize the Coast Guard's aging fleet of deepwater-capable ships and aircraft. It is the largest and most complex acquisition effort in Coast Guard history, encompassing 91 new cutters, 124 new small surface craft, and 244 new or converted airplanes, helicopters, and unmanned aerial vehicles (UAVs). The Deepwater program has received a total of about \$4.4 billion through FY2007, including about \$1.14 billion in FY2007. The Coast Guard's proposed FY2008 budget requests \$836.9 million for the program.

The Coast Guard is pursuing the Deepwater program as a system-of-systems acquisition project, under which a combination of cutters, patrol boats, aircraft, supporting communications equipment, and logistic support is to be procured as a single, integrated package. To execute this system-of-systems acquisition approach, the Coast Guard is using a lead system integrator (LSI) — a private-sector entity responsible for designing, building, and integrating the various elements of the package.

The management and execution of the Deepwater program has been strongly criticized in recent weeks by the Department of Homeland Security Inspector General (DHS IG), the Defense Acquisition University (DAU), the Government Accountability Office (GAO), several Members of Congress from committees and subcommittees that oversee the Coast Guard, and other observers. Between late-January and mid-February 2007, House and Senate committees and subcommittees conducted several oversight hearings devoted partly or entirely to problems and concerns regarding the management and execution of the program.

Potential options for Congress regarding the Deepwater program include but are not limited to the following, some of which might be combined: track and assess the changes that the Coast Guard has stated it will implement regarding management and execution of the Deepwater program; institute additional or stricter reporting requirements for the Deepwater program; encourage or require the Coast Guard to implement recommendations for the Deepwater program made by third parties that the Coast Guard has not already agreed to implement; encourage or require the Coast Guard to do certain things (such as make greater use of the Navy or other third-party, independent sources of expertise to help the Coast Guard manage the program; hold a new competition, open to all bidders, for the LSI role; reduce the role of the LSI to that of a coordinator of Deepwater program efforts managed and executed by various firms acting as prime contractors for their various efforts; end the use of an LSI in favor of direct Coast Guard management and integration of the program; or replace the Deepwater program with a series of separate procurement programs for replacing individual classes of cutters, boats, and aircraft); and prohibit the obligation or expenditure of some or all FY2008 funding for the Deepwater program until the Coast Guard or the Department of Homeland Security (DHS) takes certain actions or makes certain certifications regarding the Deepwater program. This report will be updated as events warrant.

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# Coast Guard Deepwater Program: Background, Oversight Issues, and Options for Congress

## Introduction

The Integrated Deepwater Systems (IDS) program, or Deepwater program for short, is a \$24-billion, 25-year project to replace and modernize the Coast Guard's aging fleet of deepwater-capable ships and aircraft. It is the largest and most complex acquisition effort in Coast Guard history, encompassing 91 new cutters, 124 new small surface craft, and 244 new or converted airplanes, helicopters, and unmanned aerial vehicles (UAVs).

The Deepwater program has received a total of about \$4.4 billion through FY2007, including \$1,144.6 million in FY2007. The Coast Guard's proposed FY2008 budget requests \$836.9 million for the program.

The management and execution of the Deepwater program has been strongly criticized in recent weeks by the Department of Homeland Security Inspector General (DHS IG), the Defense Acquisition University (DAU), the Government Accountability Office (GAO), several Members of Congress from committees and subcommittees that oversee the Coast Guard, and other observers. Between late-January and mid-February 2007, House and Senate committees and subcommittees conducted several oversight hearings devoted partly or entirely to problems and concerns regarding the management and execution of the program.

Congress has several potential options it may consider for improving management and execution of the Deepwater program. Congress's decisions regarding the Deepwater program could significantly affect Coast Guard capabilities, Coast Guard funding requirements, and the U.S. aerospace and defense industrial base.

## Background<sup>1</sup>

### Deepwater Missions

The Coast Guard performs a variety of missions in the deepwater environment, which generally means waters more than 50 miles from shore. These mission include

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<sup>1</sup> For additional background information on the Deepwater program on the internet, log onto [<http://www.uscg.mil/deepwater/>] and [<http://www.teamdeepwater.com>].

drug interdiction, alien migrant interdiction, fisheries enforcement, search and rescue, the International Ice Patrol in northern waters; overseas maritime intercept (sanctions-enforcement) operations, overseas port security and defense, overseas peacetime military engagement; general defense operations in conjunction with the Navy; marine pollution law enforcement, enforcement of lightering (i.e., at-sea cargo-transfer) zones, and overseas inspection of foreign vessels entering U.S. ports. Deepwater-capable assets are also used closer to shore for various operations.

## Legacy Deepwater-Capable Assets

When the Deepwater program began in the late 1990s, the Coast Guard's existing (i.e., "legacy") assets for performing deepwater missions included 93 aging cutters and patrol boats and 207 aging aircraft. Many of these ships and aircraft are expensive to operate (in part because the cutters require large crews), increasingly expensive to maintain, technologically obsolete, and in some cases poorly suited for performing today's deepwater missions.

## Deepwater Acquisition Program

### **System-of-Systems Acquisition With Lead System Integrator (LSI).**

Rather than replacing its various deepwater-capable cutters, patrol boats, and aircraft through a series of individual procurement programs, the Coast Guard decided to pursue a system-of-systems acquisition, under which a combination of new and modernized cutters, patrol boats, aircraft, along with associated C4ISR systems<sup>2</sup> and logistics support, would be procured as a single, integrated package. To execute this system-of-systems acquisition approach, the Coast Guard is using a lead system integrator (LSI) — a private-sector entity responsible for designing, building, and integrating the various elements of the package so that it meets the Coast Guard's projected deepwater operational requirements at the lowest possible cost.

The Coast Guard believes that a system-of-systems approach permits the Deepwater project to be optimized (i.e., made cost effective) at the overall, system-of-systems level, rather than suboptimized at the level of individual platforms and systems. The Coast Guard decided on using an LSI to execute the Deepwater program in large part because the size and complexity of the project was beyond the system-integration capabilities of the Coast Guard's relatively small in-house acquisition work force. Another major acquisition effort being pursued as a system-of-systems acquisition with an LSI is the Army's Future Combat System (FCS).<sup>3</sup>

**Contract Award and Extension.** The Coast Guard ran a competition for the Deepwater LSI role. Three industry teams competed, and on June 25, 2002, the Coast Guard awarded the role to Integrated Coast Guard Systems (ICGS) — an industry team led by Lockheed Martin and Northrop Grumman's Ship Systems

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<sup>2</sup> C4I stands for command, control, communications, computers, intelligence, surveillance, and reconnaissance.

<sup>3</sup> For more on the FCS program, see CRS Report RL32888, *The Army's Future Combat System (FCS): Background and Issues for Congress*, by Andrew Feickert.

division. ICGS was awarded an indefinite delivery, indefinite quantity contract for the Deepwater program that includes a five-year baseline term ending in June 2007, and five potential additional award terms of up to five years (60 months) each. On May 19, 2006, the Coast Guard announced that it was awarding ICGS a 43-month first additional award term, reflecting good but not excellent performance by ICGS. With this additional award term, the contract will extend to January 2011.

**Revised Implementation Plan.** The original (1998) Deepwater implementation plan reflected a pre-9/11 analysis of Coast Guard mission demands. On March 25, 2005, the Coast Guard submitted to Congress a revised Deepwater implementation plan reflecting a post-9/11 analysis of Coast Guard mission demands. The revised implementation plan increased the Deepwater program's estimated acquisition cost from \$17 billion to \$24 billion, and the program's acquisition period from about 20 years to 25 years.

Some observers have expressed concern that the revised Deepwater implementation plan increased the Deepwater program's estimated total acquisition cost from \$17 billion to \$24 billion. An April 2006 Government Accountability Office (GAO) report stated the following:

The revised Deepwater implementation plans change the balance between new and legacy assets, alter the delivery schedule for some assets, lengthen the overall acquisition schedule by 5 years, and increase the projected program cost from \$17 billion to \$24 billion. The higher cost generally relates to upgrading assets to reflect added homeland security mission requirements. Upgrades to vessels account for the single largest area of increase; with upgrades to the command, control, communications and other capabilities being second highest. In contrast, because the revised plans upgrade rather than replace most legacy aircraft and reduce the number of unmanned aircraft, the cost for Deepwater aircraft drops. The revised plans, like the original plan, are heavily dependent on receiving full funding each year. Coast Guard officials state that a shortfall in funding in any year could substantially increase total costs.<sup>4</sup>

Some observers expected the revised Deepwater implementation plan to include more ships and aircraft than the original (1998) Deepwater plan. A 2004 RAND Corporation report recommended substantially increasing the numbers of cutters and aircraft to be acquired under the original plan.<sup>5</sup> The revised implementation plan, however, did not substantially increase ship and aircraft numbers. The Coast Guard says the revised force would have considerably more capability than the 1998-planned force because the ships and aircraft would be individually more capable than under the 1998 plan. Coast Guard officials have also acknowledged, however, that the revised force would not have enough capacity to meet long-term (FY2005-

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<sup>4</sup> Government Accountability Office: *Coast Guard[:] Changes to Deepwater Plan Appear Sound, and Program Management Has Improved, but Continued Monitoring Is Warranted*, GAO-06-546, Jun. 2006.

<sup>5</sup> John Birkler, et al., *The U.S. Coast Guard's Deepwater Force Modernization Plan: Can It Be Accelerated? Will It Meet Changing Security Needs?* RAND, National Security Research Division, MG-114, 2004.

FY2009) Government Performance and Review Act (GPRA) goals. An April 2006 GAO report concluded that

The Coast Guard's analytical methods were appropriate for determining if the revised asset mix would provide greater mission performance and whether the mix is appropriate for meeting Deepwater missions. GAO and other independent experts found the Coast Guard's methods were reliable for assessing the effects of changing the asset mix and a Department of Defense review board facilitated accreditation of the Coast Guard's approach."<sup>6</sup>

**Systems to Be Procured or Converted.** The revised implementation plan includes the acquisition of the following:

**Ships, boats, and surface craft:**

- 8 new *National Security Cutters, or NSCs*, displacing about 4,000 tons each (i.e., ships analogous to today's high-endurance cutters);
- 25 new *Offshore Patrol Cutters, or OPCs*, displacing about 3,200 tons each (i.e., ships analogous to today's medium-endurance cutters);
- 58 new *Fast Response Cutters (FRCs)* displacing 200 tons each;
- 33 new *Long Range Interceptor (LRI) craft* displacing 15 tons each; and
- 91 new *Short Range Prosecutor (SRP) craft* displacing 9 tons each.

**Aircraft:**

- 6 missionized *HC-130J* and 16 converted *HC-130H Long Range Search (LRS) aircraft*;
- 36 new *HC-144A Medium Range Maritime Patrol Aircraft (MPA)* based on the European Aeronautic Defence and Space Company (EADS) CASA HC-235 Persuader MPA aircraft design;
- 42 converted *HH-60J Medium Range Recovery (MRR) helicopters*;
- 95 converted *HH-65C Multi-Mission Cutter Helicopters (MCHs)*;
- 45 new *HV-911 Eagle Eye VTOL (vertical take-off or landing) Unmanned Aerial Vehicles (VUAVs)*; and
- 4 leased *RQ-4A Global Hawk High Altitude Endurance UAVs (HAEUAVs)*.

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<sup>6</sup> Government Accountability Office: *Coast Guard[:] Changes to Deepwater Plan Appear Sound, and Program Management Has Improved, but Continued Monitoring Is Warranted*, GAO-06-546, Jun. 2006.

For further discussion regarding the adequacy of proposed Deepwater assets, see Statement of Ronald O'Rourke, Specialist in National Defense, Congressional Research Service, Before the Senate Commerce, Science, and Transportation Committee Subcommittee on Fisheries and the Coast Guard Hearing on the Coast Guard's Revised Deepwater Implementation Plan, June 21, 2005, pp. 1-5.



**Program Funding.** Table 1 below shows funding for the Deepwater program. As can be seen in the table, the program has received a total of about \$4.4 billion through FY2007, including \$1,144.6 million in FY2007. The Coast Guard's proposed FY2008 budget requests \$836.9 million for the program.

**Table 1. Deepwater Program Funding**  
(in millions of dollars, rounded to nearest tenth)

	Prior <sup>a</sup>	FY02	FY03	FY04	FY05	FY06	FY07	FY08
Request	n/a	320.2	500.0	500.0	678	966.0	934.4	836.9
Appropriation	n/a	320.2	478.0	668.2	724.0	933.1	1,065.9	
Rescissions	n/a		3.1	57.6	38.9	98.7		
Transfers	n/a				49.7	77.8	78.7	
Supplemental approps	n/a					124.2		
<b>Total<sup>b</sup></b>	<b>117.0</b>	<b>320.2</b>	<b>474.9</b>	<b>610.6</b>	<b>734.8</b>	<b>1,036.4</b>	<b>1,144.6</b>	
<b>Cumulative total<sup>b</sup></b>	<b>117.0</b>	<b>437.2</b>	<b>912.1</b>	<b>1,522.7</b>	<b>2,257.5</b>	<b>3,293.9</b>	<b>4,438.5</b>	

**Source:** Prepared by CRS using Coast Guard data provided on January 29, 2007, and proposed Coast Guard FY2008 budget.

n/a = not available

a. Pre-award funding prior to 2002.

b. Excludes HC-130J funding prior and airborne use-of-force funding prior to FY2007.

**Earlier Interest In Potential For Program Acceleration.** Prior to recent strong criticisms regarding management and execution of the Deepwater program, some Members expressed interest in accelerating procurement of Deepwater assets and thereby compressing the Deepwater acquisition period from 25 years to 15 or 10 years, so as to reduce total Deepwater acquisition costs and more quickly replace legacy assets. Some of these Members expressed disappointment that the Coast Guard's revised implementation plan lengthened the program's acquisition period from about 20 years to 25 years. Compressing the Deepwater program's acquisition period to 15 or 10 years could reduce total Deepwater acquisition costs but would require substantially increasing annual Deepwater acquisition funding levels.<sup>7</sup>

A 2004 RAND Corporation report, using the original (pre-2005) Deepwater implementation plan, concluded that "the shipbuilding and air vehicle industrial bases could produce the USCG's Deepwater assets on either the 15-year or the

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<sup>7</sup> Section 888(I) of H.R. 5005/P.L. 107-296 directed DHS to report to Congress on the idea of compressing the Deepwater program from 20 years to 10 years. On March 12, 2003, the Coast Guard submitted the report, which concluded that compressing the Deepwater acquisition period to 10 years was feasible, that it would increase Deepwater acquisition costs over the period FY2005-FY2011 by about \$7.4 billion in then-year dollars, but reduce total Deepwater acquisition costs over the long run from \$16.022 billion in then-year dollars to \$11.473 billion in then-year dollars. (U.S. Coast Guard, *Report to Congress on the Feasibility of Accelerating the Integrated Deepwater System*, 2003.)

10-year schedule. Manufacturers would require no major facility upgrades to accommodate acceleration.”<sup>8</sup> GAO has cautioned that accelerating the Deepwater program could increase program-management risks, but has also acknowledged that accelerating selected parts of the program might be more feasible.

## Primary Oversight Issue for Congress

### Program Management and Execution

The current primary oversight issue for Congress regarding the Deepwater program is the overall management and execution of the program. As mentioned earlier, the management and execution of the Deepwater program has been strongly criticized in recent weeks by the Department of Homeland Security Inspector General (DHS IG), the Defense Acquisition University (DAU), the Government Accountability Office (GAO), several Members of Congress from committees and subcommittees that oversee the Coast Guard, and other observers.

This section provides a summary discussion of this issue. For additional information, see the reprinted portions of reports and testimony in the appendixes to this report.

**Recent Congressional Hearings.** Between late-January and mid-February 2007, House and Senate committees and subcommittees conducted several oversight hearings devoted partly or entirely to problems and concerns regarding the management and execution of the Deepwater program. Examples of such hearings include

- a January 30, 2007, hearing before the Coast Guard and Maritime Transportation subcommittee of the House Transportation and Infrastructure Committee;
- February 6 and 15, 2007, hearings before the Homeland Security subcommittee of the House Appropriations Committee
- a February 8, 2007, hearing before the House Committee on Oversight and Government Affairs; and
- a February 14, 2007, hearing before the Oceans, Atmosphere, Fisheries, and Coast Guard subcommittee of the Senate Commerce, Science and Transportation Committee.

These hearings discussed problems in executing three Deepwater cutter acquisition efforts, and recent reports from the DHS IG, DAU, and GAO about both

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<sup>8</sup> John Birkler, et al., *The U.S. Coast Guard's Deepwater Force Modernization Plan: Can It Be Accelerated? Will It Meet Changing Security Needs?* RAND, National Security Research Division, MG-114, 2004.

these acquisition efforts and the Coast Guard's overall management of the Deepwater program.

**Problems In Cutter Acquisition Efforts.** The Deepwater cutter acquisition efforts that have experienced problems are the new National Security Cutter (NSC), the 110-foot patrol boat modernization effort, and the new Fast Response Cutter (FRC).

**National Security Cutter (NSC).** A DHS IG report released in January 2007 strongly criticized the NSC program, citing design flaws in the ship and the Coast Guard's decision to start construction of NSCs in spite of early internal notifications about these flaws. The DHS IG report also noted considerable growth in the cost to building the first two NSCs, and other issues.<sup>9</sup>

**110-Foot Patrol Boat Modernization.** As part of the Deepwater program, the Coast Guard originally planned to modernize its 49 existing Island-class 110-foot patrol boats so as to improve their capabilities and extend their lives until their planned eventual replacement with new Deepwater Fast Response Cutters (FRCs) starting in 2018. Among other things, the modernization lengthened the boats to 123 feet. The program consequently is referred to as the 110-foot or 123-foot modernization program.

Eight of the boats were modernized at an average cost of about \$8.5 million each; the first was delivered in March 2004. Structural problems were soon discovered in them. In June 2005, the Coast Guard stopped the modernization effort at eight boats after determining that they lacked capabilities needed for meeting post-9/11 Coast Guard operational requirements.

On November 30, 2006, the Coast Guard announced that it was suspending operations of the eight modernized 123-foot patrol boats (which were assigned to Coast Guard Sector Key West, FL) due to the discovery of additional structural damage to their hulls. The suspension prompted expressions of concern that the action could reduce the Coast Guard's border-enforcement capabilities in the Caribbean. The Coast Guard said it was exploring options for addressing operational gaps resulting from the decision.<sup>10</sup>

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<sup>9</sup> Department of Homeland Security, Office of Inspector General, *Acquisition of the National Security Cutter*, OIG -07-23, January 2007. The report is available online at [[http://www.dhs.gov/xoig/assets/mgmttrpts/OIG\\_07-23\\_Jan07.pdf](http://www.dhs.gov/xoig/assets/mgmttrpts/OIG_07-23_Jan07.pdf)].

<sup>10</sup> "Coast Guard Statement on Suspension of Converted Patrol Boat Operations," *InsideDefense.com*, Nov. 30, 2006; Patricia Kime, "U.S. Coast Guard Pulls 123s Out of Service," *DefenseNews.com*, Nov. 30, 2006; Calvin Biesecker, "Coast Guard Suspends 123-Foot Patrol Boat Operations," *DefenseDaily*, Dec. 1, 2006; Robert Block, "Coast Guard Fleet Cuts Could Hurt Border Patrols," *Wall Street Journal*, Dec. 1, 2006; Renae Merle, "Coast Guard Finds Flaws In Converted Patrol Boats," *Washington Post*, Dec. 2, 2006; Renae Merle and Spencer S. Hsu, "Costly Fleet Update Falts," *Washington Post*, Dec. 8, 2006.

In August 2006, a former Lockheed engineer posted on the Internet a video alleging four other problems with the 110-foot patrol boat modernization effort.<sup>11</sup> The engineer had previously presented these problems to the DHS IG, and a February 2007 report from the DHS IG confirmed two of the four problems.<sup>12</sup>

**Fast Response Cutter (FRC).** As a result of the problems in the 110-foot patrol boat modernization project, the Coast Guard accelerated the FRC design and construction effort by 10 years. Problems, however, were discovered in the FRC design, and the Coast Guard in February 2006 suspended work on the design.

The Coast Guard has now divided the 58-ship FRC effort into two classes — 12 FRC-Bs, which are to be procured as a near-term stop-gap measure and which are to be based on an existing patrol boat design (which the Coast Guard calls a “parent craft” design), and 46 subsequent FRC-As, which are to be based on a fixed version of the new FRC design. The Coast Guard by mid-November 2006 reportedly had looked at 27 candidate designs submitted by 19 manufacturers for the FRC-B effort. In December 2006, the Coast Guard issued a Request for Proposals (RFP) to ICGS for the FRC-B.

**Concerns Regarding Overall Management Of The Program.** Some observers believe the problems experienced in the three cutter acquisition efforts are the product of broader problems in the Coast Guard’s overall management of the Deepwater program. A February 2007 DAU “quick look study,”<sup>13</sup> as well as reports from the DHS IG and GAO, have expressed serious concerns about the Coast Guard’s overall management of the Deepwater program. These reports, as well as Members of Congress and other observers, have raised concerns about a number of actual or alleged problems.

Some observers have expressed the view that using an LSI to implement the Deepwater program made a complex program more complex, and set the stage for waste, fraud, and abuse by effectively outsourcing oversight of the program to the private sector and by creating a conflict of interest for the private sector in executing the program.

Other observers, including the DAU and GAO, have expressed the view that the LSI approach is basically valid, but that the contract used to implement the approach for the Deepwater program was flawed in various ways, undermining the Coast

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<sup>11</sup> Patricia Kime, “Video Alleges Security Problems With Converted U.S. Coast Guard Cutters,” *DefenseNews.com*, Aug. 7, 2006. See also Griff Witte, “On YouTube, Charges Of Security Flaws,” *Washington Post*, Aug. 29, 2006. The video is posted on the Internet at [<http://www.youtube.com/watch?v=qd3VV8Za04g>].

<sup>12</sup> Department of Homeland Security, Office of Inspector General, *110’/123’ Maritime Patrol Boat Modernization Project*, OIG -07-27, January 2007. The report is available online at [[http://www.dhs.gov/xoig/assets/mgmttrpts/OIG\\_07-27\\_Feb07.pdf](http://www.dhs.gov/xoig/assets/mgmttrpts/OIG_07-27_Feb07.pdf)].

<sup>13</sup> Defense Acquisition University, *Quick Look Study, United States Coast Guard Deepwater Program*, February 2007.

Guard's ability to assess contractor performance, control costs, ensure accountability, and conduct general oversight of the program.

Observers have raised various issues about the Deepwater contract. Among other things, they have expressed concern that the contract is an indefinite delivery, indefinite quantity (ID/IQ) contract, which can be an inappropriate kind of contract for a program like the Deepwater program. Observers have also expressed concern that the contract

- transferred too much authority to the LSI for defining performance specifications, for subsequently modifying them, and for making technical judgements;
- permitted the LSI to certify that certain performance goals had been met — so-called self-certification, which, critics argue, can equate to no meaningful certification;
- provided the Coast Guard with insufficient authority over the LSI for resolving technical disputes between the Coast Guard and the LSI;
- was vaguely worded with regard to certain operational requirements and technical specifications, reducing the Coast Guard's ability to assess performance and ensure that the program would achieve Coast Guard goals;
- permitted the firms making up the LSI to make little use of competition between suppliers in selecting products to be used in the Deepwater program, to tailor requirements to fit their own products, and consequently to rely too much on their own products, as opposed to products available from other manufacturers;
- permitted the LSI's performance during the first five-year period to be scored in a way that did not sufficiently take into account recent problems in the cutter acquisition efforts;
- permitted award fees and incentive fees (i.e., bonuses) to be paid to the LSI on the basis of "attitude and effort" rather than successful outcomes; and
- lacked sufficient penalties and exit clauses.

Observers have also expressed concern that the Coast Guard does not have enough in-house staff and in-house expertise in areas such as program management, financial management, and system integration, to properly oversee and manage an acquisition effort as large and complex as the Deepwater program, and that the Coast Guard did not make sufficient use of the Navy or other third-party, independent sources of technical expertise, advice, and assessments. They also have expressed concern that the Coast Guard, in implementing the Deepwater program, has placed a higher priority on meeting a schedule as opposed to ensuring performance.

In addition, observers have stated that the Coast Guard proceeded with construction of the first NSCs in spite of early internal warnings about flaws in the NSC design, failed to report problems about the NSC effort to Congress on a timely basis, resisted efforts by the DHS IG to investigate the NSC effort, and appears to have altered briefing slides on the NSC effort so as to downplay the design flaws to certain audiences.

**Coast Guard Response.** The Coast Guard has acknowledged problems in the management and execution of the Deepwater program and has stated that it will make changes to improve the situation. The Coast Guard has also stated that some recent criticisms of the program are inaccurate or based on misunderstandings (at least one of which has since been resolved), and that the successful accomplishments of the Deepwater program to date, in areas such as aircraft acquisition and modernization, are being overlooked.

The Coast Guard has announced a reorganization of certain Coast Guard commands that is intended in part to strengthen the Coast Guard's ability to manage acquisition projects, including the Deepwater program. The Coast Guard has also stated that it is making additional internal changes specifically targeted at improving its ability to manage the Deepwater program. The Coast Guard states that it plans to alter the terms of the Deepwater contract for the 43-month award term that commences in mid-2007 so as to address concerns raised about the current Deepwater contract. The Coast Guard has stated in testimony that it concurs with many of the recommendations made in the DHS IG reports, and is moving to implement them. The Coast Guard states that it asked for the DAU quick look study in weighing its recommendations. The Coast Guard has also implemented many recommendations regarding Deepwater program management that have been made by GAO.

As mentioned earlier, for additional information on the issues discussed above, see the reprinted portions of reports and testimony in the **appendixes** to this report.

## Potential Options for Congress

Potential options for Congress regarding the Deepwater program include but are not limited to the following, some of which might be combined:

- track and assess the changes that the Coast Guard has stated it will implement regarding management and execution of the Deepwater program;
- institute additional or stricter reporting requirements for the Deepwater program;
- encourage or require the Coast Guard to implement recommendations for the Deepwater program made by the DAU, the DHS IG, and GAO that the Coast Guard has not already agreed to implement;

- encourage or require the Coast Guard to make greater use of the Navy or other third-party, independent sources of expertise to help the Coast Guard manage the program;
- encourage or require the Coast Guard to cancel its 43-month award period to the current LSI and to hold a new competition, open to all bidders, for the LSI role;
- encourage or require the Coast Guard to reduce the role of the LSI to that of a coordinator of Deepwater program efforts managed and executed by various firms acting as prime contractors for their various efforts;
- encourage or require the Coast Guard to end the use of an LSI in favor of direct Coast Guard management and integration of the program;
- encourage or require the Coast Guard to replace the Deepwater program with a series of separate procurement programs for replacing individual classes of cutters, boats, and aircraft; and
- prohibit the obligation or expenditure of some or all FY2008 funding for the Deepwater program until the Coast Guard or DHS takes certain actions or makes certain certifications regarding the Deepwater program.

## **Legislative Activity in 2007**

The Coast Guard's proposed FY2008 budget requests \$836.9 million for the program. Between late-January and mid-February 2007, House and Senate committees and subcommittees conducted several oversight hearings devoted partly or entirely to problems and concerns regarding the management and execution of the program.

## Appendix A: DAU Quick Look Study

The executive summary of the DAU “quick look” study on the Deepwater program<sup>14</sup> states:

The Defense Acquisition University (DAU) conducted a “quick look” study of the United States Coast Guard (USCG) Deepwater Program (DW) in October and November 2006 to provide findings and recommendations to the Program Executive Officer (PEO) Integrated Deepwater System (IDS) for improvement of program performance. The study team reviewed program documentation and conducted interviews with government and industry officials and staff. Preliminary findings and recommendations were developed for the purpose of discussions with the PEO IDS and other USCG officials.

This report is a synthesis of the study team’s review and ensuing discussions with USCG officials, including the USCG Agency Acquisition Executive (AAE). The team experienced an extraordinary high level of cooperation and candor throughout the study and during the follow-on discussions. The study team has reviewed a USCG plan titled a *Blue Print for Acquisition Reform* that is comprehensive and responsive to the human capital, organization, process and governance related findings and recommendations in this report. The objective of the “*Blue Print*” is to establish the USCG as a model of acquisition excellence in a mid-sized agency.

The USCG has consistently demonstrated the ability to successfully acquire and sustain systems of moderate complexity and scope. The Integrated Deepwater System is an acquisition program of significantly greater scope and complexity. The need to quickly recapitalize the USCG with a portfolio of new capabilities led to the Systems of Systems (SoS) acquisition strategy. The SoS strategy, however, required increased numbers of acquisition personnel, significantly greater depth of major systems acquisition management experience, and increased integration of USCG resources, oversight and governance.

The significant events of 9/11 and realignment of the USCG under the Department of Homeland Security (DHS) further increased the scope and complexity of USCG maritime security missions. The extent of the changes needed in USCG acquisition competencies, numbers of personnel, organizational structure, management, oversight, governance and decision making are now recognized and addressed in the *Blue Print for Acquisition Reform*. The sustained commitment of the Commandant and other USCG leadership will be required to meet the challenge of a reform of this magnitude, concurrent with the procurement of Deepwater, other new capabilities and sustainment of current capabilities.

### Overarching findings and recommendations:

- The SoS strategy for recapitalization of the USCG had the potential to optimize the acquisition of capabilities to meet a diverse portfolio of USCG missions and minimize total ownership cost. A rigorous pre-acquisition study phase and full and open competition resulted in award of a contract to Integrated Coast Guard

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<sup>14</sup> Defense Acquisition University, *Quick Look Study, United States Coast Guard Deepwater Program*, February 2007.



Systems (ICGS), a joint venture involving operating units of Northrop Grumman (NG) and Lockheed Martin (LM). The significant events of 9/11 and expanded USCG missions arising from alignment under (DHS), challenged execution of the DW acquisition strategy and the results have not been as planned. Primary causes include:

- Requirements changes that were necessary to accommodate increased missions, many after the completion of key systems engineering milestones
- Funding at levels below the contract negotiated with ICGS
- Contract structure that is inappropriate to the environment of changing missions and requirements, and major systems integration
- Industry emphasis on work sharing among the joint venture partners that has minimized the use of other US industry and existing USCG support infrastructure
- Insufficient numbers of USCG acquisition personnel and insufficient experience in major systems acquisition
- Lack of a management model and processes sufficient for the management and oversight of the major systems acquisition environment of DW

These causes have significantly increased the risk of procuring the DW capabilities required for USCG missions within the estimate of \$24 billion. De-scoping of requirements or adjustment to the budget is needed. **The study team recommends changes in acquisition strategy, contract structure and management. In addition, changes in USCG governance, organization, processes and acquisition workforce are recommended (and specifically addressed in the *Blue Print for Acquisition Reform*.**

The USCG does not now possess sufficient numbers of acquisition personnel or the level of major systems acquisition experience needed to manage the DW and other USCG acquisition programs. Major systems acquisition competency areas that are in the greatest need of infusion of experience are program management, contracting, and financial management (including earned value management and cost estimating). A package of interrelated actions including reorganization, additional acquisition personnel, training, and recruitment of acquisition professionals across the spectrum of acquisition competencies is urgently needed. Reorganization, for example, is necessary, but it will not be, of itself, sufficient alone. **The study team recommends a combination of human capital initiatives: recruitment of personnel with significant major systems acquisition experience; training and mentoring of existing personnel; and establishment of policies and processes that place acquisition excellence and the development of business competencies at a level equivalent to the value the USCG places on operational excellence and experience.**

- A combination of factors, including requirements changes, funding at levels inconsistent with the negotiated contract, and insufficient numbers and experience

of acquisition personnel, have resulted in the use of Undefined Contract Actions (UCAs) at an inappropriately high level. At one point, the level exceeded one billion dollars. **The study team recommends expedited negotiation of UCAs to eliminate the backlog and to increase pressure on the contractor to manage costs. A rigorous review and approval process for future UCAs is also recommended.**

- An integrated logistics support strategy that is inclusive of capabilities being procured through DW and other USCG programs is needed. The limited level of integration of DW and the engineering and logistics support infrastructure of USCG has inhibited logistics planning. The level and apportionment of appropriations for DW has required the USCG, at times, to decide between procurement of urgently needed capabilities and the initial support for those capabilities. Flexibility to reallocate funds during execution has been limited by a restrictive below threshold reprogramming authority (as compared to the Department of Defense (DoD)). The roles and responsibilities of ICGS as compared to the existing USCG support infrastructure need to be rationalized, and business case analysis adopted as a practice. **The study team recommends a combination of actions: develop a policy to rationalize the role of systems integrators and USCG organic capabilities; an integrated support strategy reflecting DW and other USCG acquisition programs; a legislative initiative (coordinated with DHS) to provide greater flexibility in the reprogramming of funds during execution; and actions to ensure adequate logistics support of the introduction of the Maritime Patrol Aircraft (MPA) and the first National Security Cutter (NSC).**
- Significant improvements in major systems financial management processes and workforce experience are needed. Factors such as the significant number of requirements changes, funding at levels below those planned, and insufficient numbers and experience of acquisition personnel have made it difficult to maintain an authoritative DW life cycle cost estimate. The study team also noted that independent cost estimates are not routinely developed in the USCG.

Drawing upon its DoD experience, the study team believes that government and industry are incentivized to underestimate the cost of new systems and their support. The business of defense is serious and there are numerous incentives to be optimistic when scoping and estimating the cost of new capabilities. As a balance, major systems acquisition management processes have developed, including independent cost estimates. **The study team recommends immediate action to update the DW cost estimate, an independent cost estimate of the program, and policy to require independent cost estimates of major changes.** Until then, there should be low confidence that the DW program will be acquired and supported within the current budget.

During the study and follow-on discussions with USCG officials, the team noted significant actions being taken to improve the performance of DW and other USCG acquisition programs and support. Actions resulting from the Commandant's written orders are now codified in an integrated plan to reform USCG acquisition. With respect

to Deepwater, actions taken subsequent to the study team's preliminary findings and recommendations include:

- The Commandant and AAE have initiated discussions with the Chief Executive Officers of NG and LM to examine the government/industry relationship with the aim of reframing the contractual relationship in the light of lessons learned over the last five years
- PEO IDS has initiated actions to improve acquisition and logistics planning and execution, including reduction of the backlog of UCAs
- Alternative acquisition plans have been developed and forwarded to the Department of Homeland Security (DHS) to accelerate the acquisition of selected critical operational capabilities
- In collaboration with the Assistant Commandant for Acquisition, the PEO has defined a structure and plan to integrate acquisition functions of DW and other USCG acquisition programs (*consistent with the Blue Print for Acquisition Reform*)
- The PEO has collaborated with the Acquisition Directorate to conduct business case analyses to support DW decisions
- The PEO has identified initial increases in acquisition workforce to DHS
- The PEO has expanded the involvement of CG-4 engineering and logistics professionals involved in DW, in collaboration with the Assistant Commandant, Logistics and Engineering
- The PEO has collaborated with the Assistant Commandant for Command, Control, Communications, Computers and Information Technology (C4-IT) to review and ensure alignment of DW C4ISR to the USCG C4-IT architecture and DW C4ISR affordability



## **Appendix B: DHS IG Testimony And Reports**

### **February 14, 2007, Testimony On Deepwater Program**

At a February 14, 2007 hearing on the Deepwater program before the Oceans, Atmosphere, Fisheries, and Coast Guard subcommittee of the Senate Commerce, Science and Transportation Committee, the DHS IG testified in part:

We have completed audits of the 110-foot/123-foot Modernization Project; the National Security Cutter, the information technology systems; and the re-engining of the HH-65 helicopters. Common themes and risks emerged from these audits, primarily the dominant influence of expediency, flawed contract terms and conditions, poorly defined performance requirements, and inadequate management and technical oversight. These deficiencies contributed to schedule delays, cost increases, and asset designs that failed to meet minimum Deepwater performance requirements.

#### **Lead Systems Integrator Approach**

The route the Coast Guard took to outsource program management to the systems integrator has presented challenges in implementation. The Deepwater contract essentially empowered the contractor with authority for decision-making. Therefore, the Coast Guard was reluctant to exercise a sufficient degree of authority to influence the design and production of its own assets. Specifically, under the contract ICGS was the Systems Integrator and assigned full technical authority over all asset design and configuration decisions; while the Coast Guard's technical role was limited to that of an expert "advisor." However, there is no contractual requirement that the Systems Integrator accept or act upon the Coast Guard's technical advice, regardless of its proven validity. Furthermore, there are no contract provisions ensuring government involvement into subcontract management and "make or buy" decisions. The systems integrator decides who is the source of the supply. Also, as the primary management tool for the Coast Guard to contribute its input on the development of Deepwater assets, the effectiveness of the contractor-led Integrated Product Teams (IPTs) in resolving the Coast Guard's technical concerns has been called into question by both the GAO and my office.

#### **Contractor Accountability**

Our reviews have raised concerns with the definition and clarity of operational requirements, contract requirements and performance specifications, and contractual obligations. For example, in our report of the NSC, we reported the Coast Guard and the American Bureau of Shipping (ABS) jointly developed standards that would govern the design, construction, and certification of all cutters acquired under the Deepwater Program. These standards were intended to ensure that competing industry teams developed proposals that met the Coast Guard's unique performance requirements. Prior to the Phase 2 contract award, the Coast Guard provided these design standards to the competing industry teams. Based on their feedback, the Coast Guard converted the majority of the standards (85% of the 1,175 standards) to guidance and permitted the industry teams to select their own alternative standards. Without a contractual mechanism in place to ensure that those alternative standards met or exceeded the original

guidance standards, the competing teams were allowed to select cutter design criteria.

Additionally, the Deepwater contract gives the Systems Integrator the authority to make all asset design and configuration decisions necessary to meet system performance requirements. This condition allowed ICGS to deviate significantly from a set of cutter design standards originally developed to support the Coast Guard's unique mission requirements, and ICGS was further permitted to self-certify compliance with those design standards. As a result, the Coast Guard gave ICGS wide latitude to develop and validate the design of its Deepwater cutters, including the NSC.

#### Deepwater Performance Requirements Are Ill-Defined

A lack of clarity in the Deepwater contract's terms and conditions have also compromised the Coast Guard's ability to hold the contractor accountable by creating situations where competing interpretations of key provisions exist. For example, the performance specifications associated with upgrading the information systems on the Coast Guard's 123' Island Class Patrol Boats did not have a clearly defined expected level of performance. Also, in our review of the HITRON lease, we determined that a similar lack of clarity in the asset's contractual performance requirements challenged the Coast Guard's ability to effectively assess contractor performance. On the NSC acquisition, the cutter's performance specifications were so poorly worded that there were major disagreements within the Coast Guard as to what the NSC's performance capabilities should actually be.

#### Deepwater Cost Increases

The cost of NSCs 1 and 2 is expected to increase well beyond the current \$775 million estimate, as this figure does not include a \$302 million Request for Equitable Adjustment (REA) submitted to the Coast Guard by ICGS on November 21, 2005. The REA represents ICGS's re-pricing of all work associated with the production and deployment of NSCs 1 and 2 caused by adjustments to the cutters' respective implementation schedules as of January 31, 2005. The Coast Guard and ICGS are currently engaged in negotiations over the final cost of the current REA, although ICGS has also indicated its intention to submit additional REAs for adjusted work schedules impacting future NSCs, including the additional cost of delays caused by Hurricane Katrina.

The current \$775 million estimate also does not include the cost of structural modifications to be made to the NSC as a result of its known design deficiencies. In addition, future REAs and the cost of modifications to correct or mitigate the cutter's existing design deficiencies could add hundreds of millions of dollars to the total NSC acquisition cost. We remain concerned that these and other cost increases could result in the Coast Guard acquiring fewer NSCs or other air and surface assets under the Deepwater contract.

#### Impact on Coast Guard Operational Capabilities — Short and Long Term

The Deepwater record of accomplishment has been disappointing to date. For example, while the re-engining of the HH-65 Bravo helicopters has resulted in an aircraft with significantly improved capabilities, the program has experienced schedule delays and cost increases. For example, the delivery

schedule calls for the HH-65 re-engining project to be completed by November 2007 or 16 months beyond the Commandant's original July 2006 deadline. Extending the delivery schedule has exposed HH-65B aircrews to additional risk due to the tendency of the aircraft to experience loss of power mishaps. It also delays the replacement of the eight Airborne Use of Force-equipped MH-68 helicopters that are being leased to perform the Helicopter Interdiction (HITRON) mission at a cost in excess of \$20 million per year.

There are also problems with Coast Guard's acquisition of the Vertical take-off and landing unmanned aerial vehicle (VUAV). VUAVs have the potential to provide the Coast Guard flight-deck-equipped cutters with air surveillance, detection, classification, and identification capabilities. Currently, the VUAV acquisition is over budget and more than 10 months behind schedule. The Commandant of the Coast Guard recently testified that the VUAV acquisition was under review. The Commandant indicated that the Coast Guard Research and Development Center is conducting a study and will provide recommendations for the way ahead with the VUAV. A decision by the Coast Guard to stop work on the VUAV project would significantly impact the operational capability of the NSC and OPC by limiting their ability to provide long-range surveillance away from the parent cutter. The Coast Guard's Revised Deepwater Implementation Plan, 2005 calls for the acquisition of 45 VUAVs at a total cost of approximately \$503.3 million. As of December 31, 2006, Coast Guard had obligated \$108.4 million (73%) of the \$147.7 million funded for the project.

The increased cost, schedule delays, and structural design problems associated with the 123-foot patrol boat and the FRC have further exacerbated the Coast Guard's patrol boat operational hour and capability gap. The Coast Guard is attempting to mitigate the problem by re-negotiating an agreement with the U.S. Navy to continue the operation of the 179-foot "Cyclone" class patrol boats, and to extend the operational capability of the 110-foot Island Class fleet through the use of multiple crews. While the increased operations tempo this will help in the short term, it will also increase the wear and tear on these aging patrol boats in the long term.

The structural design issues associated with the NSC could have the greatest impact on Coast Guard operational capabilities in both the near and long term. This is due to cost increases that far exceed the cost of inflation even when the post 9/11 engineering change proposals and the costs increases associated with hurricane Katrina are left out of the equation. These cost increases are largely due to: (1) existing and future Requests for Equitable adjustment that the Coast Guard expects to receive from ICGS; (2) the cost of NSC "structural enhancements," the number, type, scope, and cost of which have yet to be determined; and (3) the schedule delays and lost operational capability, that are expected during the modification to NSCs 1-8....

## Conclusion

The Coast Guard recognizes these challenges and is taking aggressive action to strengthen program management and oversight-such as technical authority designation; use of independent, third party assessments; consolidation of acquisition activities under one directorate; and redefinition of the contract terms and conditions, including award fee criteria. Furthermore, and most importantly, the Coast Guard is increasing its staffing for the Deepwater

program, and reinvigorating its acquisition training and certification processes to ensure that staff have the requisite skills and education needed to manage the program. The Coast Guard is also taking steps to improve the documentation of key Deepwater related decisions. If fully-implemented, these steps should significantly increase the level of management oversight exercised over the air, surface, and C4ISR assets that are acquired or modernized under the Deepwater Program. We look forward to working closely with the Coast Guard to continue the improvement of the efficiency, effectiveness, and economy of the Deepwater Program.<sup>15</sup>

## January 2007 Report on NSC

A January 2007 DHS IG report on the NSC effort states in part:

The NSC, as designed and constructed, will not meet performance specifications described in the original Deepwater contract. Specifically, due to design deficiencies, the NSC's structure provides insufficient fatigue strength to be deployed underway for 230 days per year over its 30-year operational service life under Caribbean (General Atlantic) and Gulf of Alaska (North Pacific) sea conditions. Coast Guard technical experts believe the NSC's design deficiencies will also increase the cutter's maintenance costs and reduce its service life. To mitigate the effects of these deficiencies, the Coast Guard intends to modify the NSC's design to support an operational profile of 170 to 180 days underway per year in the North Pacific region, lower than the 230-day performance standard required by the Deepwater contract.

The NSC's design and performance deficiencies are fundamentally the result of the Coast Guard's failure to exercise technical oversight over the design and construction of its Deepwater assets. The Coast Guard's technical experts first identified and presented their concerns about the NSC's structural design to senior Deepwater Program management in December 2002, but this did not dissuade the Coast Guard from authorizing production of the NSC in June 2004 or from awarding ICGS a contract extension in May 2006.

Since the Deepwater contract was signed in June 2002, the combined cost of NSCs 1 and 2 has increased from \$517 million to approximately \$775 million, resulting primarily from design changes necessary to meet post 9/11 mission requirements and other government costs not included in the original contract price. The \$775 million estimate does not include costs to correct or mitigate the NSC's structural design deficiencies, additional labor and materials costs resulting from the effects of Hurricane Katrina, and the final cost of a \$302 million Request for Equitable Adjustment (REA) that the Coast Guard is currently negotiating with ICGS....

Finally, we encountered resistance from the Coast Guard and ICGS in our effort to evaluate the structural design and performance issues associated with the NSC. The impediments we experienced in obtaining access to personnel, information, and documentation associated with the NSC acquisition are

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<sup>15</sup> Statement of Richard L. Skinner, Inspector General, U.S. Department of Homeland Security, Before the Subcommittee on Oceans, Atmosphere, Fisheries and Coast Guard, Committee on Commerce, Science, and Transportation, United States Senate, [hearing on] The United States Coast Guard's Deepwater Program, February 14, 2007.

unacceptable in light of the statutory mandates of our office; the severity of the NSC design and performance deficiencies; the importance of the NSC to the Coast Guard's national security and Deepwater missions; and the expenditure of billions of taxpayer dollars that are being invested in this critical acquisition.

We are making five recommendations to the Coast Guard, and one to the Department's Chief Procurement Officer and Office of General Counsel. Our recommendations are intended to: (1) ensure the National Security Cutter is capable of fulfilling all performance requirements outlined in the Deepwater contract; (2) improve the level of Coast Guard technical oversight and accountability; and (3) ensure Office of Inspector General access to all records, personnel, and contractors of the department during all current and future audits and inspections.<sup>16</sup>

The report also stated:

The Deepwater contract gives the Systems Integrator the authority to make all asset design and configuration decisions necessary to meet system performance requirements. This condition allowed ICGS to deviate significantly from a set of cutter design standards originally developed to support the Coast Guard's unique mission requirements, and ICGS was further permitted to self-certify compliance with those design standards. As a result, the Coast Guard gave ICGS wide latitude to develop and validate the design of its Deepwater cutters, including the NSC.

Conversely, the Coast Guard chose to limit the technical oversight role of the Systems Directorate on Deepwater to providing "expertise and credible advice in core integrated engineering and logistics competencies."... However, the Deepwater contract does not require that ICGS or its subcontractors accept or act upon the advice of the Coast Guard's designated technical experts. As a result of this relationship, the Coast Guard is limited in its ability to exercise technical oversight over its assets acquired under the Deepwater contract. This, in our opinion, is the primary factor contributing to the inclusion of the structural deficiencies that currently compromise the NSC's operational viability.

In contrast to the Coast Guard's approach, the U.S. Navy retains technical authority and accountability over the design and construction of its ships through the institution of Technical Warrant Holder (TWH) authority....

TWHs ensure that the technical aspects of Navy asset designs are given independent consideration by providing technical authority that is separate from program authority for cost, schedule, and performance. Navy surface asset Program Managers yield to TWH decisions on technical issues and must secure TWH approval for design changes. Efforts of the Coast Guard's technical experts to resolve their long-standing concerns with the NSC design were thwarted because they lack a similar degree of authority on Deepwater.<sup>17</sup>

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<sup>16</sup> Department of Homeland Security, Office of Inspector General, *Acquisition of the National Security Cutter*, OIG -07-23, January 2007. The report is available online at [[http://www.dhs.gov/xoig/assets/mgmttrpts/OIG\\_07-23\\_Jan07.pdf](http://www.dhs.gov/xoig/assets/mgmttrpts/OIG_07-23_Jan07.pdf)].

<sup>17</sup> Ibid, pp. 12-13.



The report also stated that the Coast Guard and the American Bureau of Shipping (ABS):

initially specified a certifying agent for each standard to ensure that all cutters would be objectively evaluated for compliance. However, the Coast Guard ultimately allowed the competing industry teams to determine the certifying entity for any non-ABS standards it selected and, to the extent that it was permitted, ICGS elected to self-certify compliance with these standards.<sup>20</sup> This decision to permit contractor self-certification contrasts sharply with the intended role of an independent certifying authority, as articulated in the Deepwater contract...

U.S. Navy and classification community subject matter experts expressed similar opinions, that, “self-certification is no certification.” By allowing contractor self-certification, the Coast Guard eliminated yet another oversight tool for ensuring that cutter designs developed under the Deepwater Program would meet both contractual and Deepwater mission performance requirements.<sup>18</sup>

The report also stated that:

the Coast Guard’s acquisition management capacity lacks the appropriate work force, business processes, and management controls for executing a major acquisition program such as the Integrated Deepwater System. Key positions are still being identified and filled. The Coast Guard is still trying to come from behind and create the organization needed to manage the program. That is why we believe the Coast Guard needs to proceed with caution as it moves forward with the implementation of the Integrated Deepwater System initiative. Expediency and urgency should not drive the acquisition; instead, the Coast Guard needs to ensure that it has the capacity to manage such an initiative. Then, and only then, can it provide assurances that it is being a good steward of the taxpayers’ dollar. Also, the Coast Guard needs to ensure performance management systems and processes are in place and functioning. The design flaws of the NSC, as well as the problems that the Coast Guard has experienced with the System Integrator’s design of the Fast Response Cutters and the 123-Cutters, clearly demonstrate that improvements are needed. The Coast Guard needs to build the management and oversight capacity that will allow it to acquire the needs to build a performance management system that will ensure:

- Transparency — a clear roadmap on how the systems integrator plans to meet the Coast Guard’s deepwater objectives.
- Visibility — a clear, open line of communications with all stakeholders on the progress of the initiative.
- Accountability — the means to determine, on a real time basis, what is working and what is not working.
- Oversight — including not only by the Coast Guard’s technical and program management offices, but also by the OIG and the Congress.<sup>19</sup>

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<sup>18</sup> Ibid, p. 14.

<sup>19</sup> Ibid, pp. 35-36. Underlining as in the original.

## February 2007 Report on 110-Foot Modernization

The February 2007 DHS IG report on the 110-foot patrol boat modernization program states in part:

On February 10, 2006, our office received a Hotline Complaint alleging that the Coast Guard's 123-foot Island Class Patrol Boats (123' cutter) and short-range prosecutor (prosecutor) contained safety and security vulnerabilities. The 123' cutter is a modification of the 110' Island Class patrol boat and was phased into service as part of the Deepwater project. The original Deepwater plan projected the conversion of forty-nine 110' patrol boats into 123' patrol boats as a bridging strategy to meet patrol boat needs until the new Fast Response Cutter was introduced. The prosecutor is a 24' 6" small boat that can be deployed from the National Security Cutter, Fast Response Cutter, and Offshore Patrol Cutter. The revised Deepwater Implementation Plan calls for the acquisition of 91 prosecutors. The complaint said that these vulnerabilities were the result of the contractor's failure to comply with Command, Control, Communications, Computer, Intelligence, Surveillance, and Reconnaissance (C4ISR) design requirements as defined in the Deepwater contract. Specifically, the complainant alleged that:

- The safety of the 123' cutter's crew was compromised by the contractor's failure to utilize low smoke cabling;
- The contractor knowingly installed aboard the 123' cutter and prosecutor external C4ISR equipment that did not meet specific environmental requirements outlined in the Deepwater contract;
- The cable installed during the upgrade to the cutter's C4ISR system represented a security vulnerability; and,
- The video surveillance system installed aboard the 123' cutter does not meet the cutter's physical security requirements.

Finally, the complainant provided information detailing his attempts, over a 2 ½ year period, to compel the contractor to comply with Deepwater contract requirements....

Aspects of the C4ISR equipment installed aboard the 123' cutters do not meet the design standards set forth in the Deepwater contract. Specifically, two of the four areas of concern identified by the complainant were substantiated and are the result of the contractor not complying with the design standards identified in the Deepwater contract. For example, the contractor did not install low smoke cabling aboard the 123' cutter, despite a Deepwater contract requirement that stated, "all shipboard cable added as a result of the modification to the vessel shall be low smoke." The intent of this requirement was to eliminate the polyvinyl chloride jacket encasing the cables, which for years produced toxic fumes and dense smoke during shipboard fire. Additionally, the contractor installed C4ISR topside equipment aboard both the 123' cutters and prosecutors, which either did not comply or was not tested to ensure compliance with specific environmental performance requirements outlined in the Deepwater contract.

The remaining two areas of concern identified by the complainant were in technical compliance with the Deepwater contract and deemed acceptable by the Coast Guard. Specifically, while the type of cabling installed during the C4ISR system upgrade to the 123' cutter was not high-grade braided cable; the type of cable used met the Coast Guard's minimum-security standards as required by the Deepwater contract. Concerning the installation of the video surveillance system,

while the system did not provide 360 degrees of coverage, it met minimum contract requirements.<sup>20</sup>

## **December 2006 Report On DHS Management Challenges**

A December 2006 DHS IG report on major DHS management challenges stated:

USCG has also encountered a number of challenges in executing its Deepwater Acquisition program despite the expenditure of more than \$3 billion over four years. This is particularly true within the Deepwater surface and air domains. For example, the 110-foot patrol boat conversion project was curtailed at eight cutters due to design, construction, performance, and cost concerns. Further, strict operational restrictions have been imposed on these cutters until additional structural analyses can be completed. In response to these challenges, USCG accelerated plans to design, construct, and deploy the composite Fast Response Cutter (FRC) by more than 10 years as a replacement for the 110-foot patrol boat. However, an independent analysis confirmed that the FRC design is outside patrol boat design parameters, i.e., too heavy, too overpowered, and not streamlined enough to reduce resistance. These concerns led to USCG's April 2006 decision to suspend work on the FRC until these issues could be resolved or an alternative commercial off-the-shelf design identified. In the Deepwater air domain, the HH-65C helicopter<sup>7</sup> and unmanned aerial vehicle (VUAV) acquisitions have encountered schedule delays and cost increases. These Deepwater design, construction, performance, scheduling, and cost issues are expected to present significant challenges to USCG's Deepwater Program during FY 2007.<sup>21</sup>

## **August 2006 Report On Deepwater IT**

An August 2006 report by the DHS Inspector General (IG) on the Coast Guard's acquisition of information technology (IT) for the Deepwater program stated:

We audited the Coast Guard's efforts to design and implement command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) systems to support the Integrated Deepwater System program. As a result of our audit, we determined that the Coast Guard's efforts to develop its Deepwater C4ISR systems could be improved. Although Coast Guard officials are involved in high-level Deepwater IT requirements definition processes, they have limited influence over contractor decisions toward meeting these requirements. A lack of discipline in requirements change management processes provides little assurance that the requirements remain up-to-date or effective in meeting program goals. Certification and accreditation of Deepwater C4ISR equipment has been difficult to achieve, placing systems security and operations at risk. Further, although the Deepwater program has established IT

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<sup>20</sup> Department of Homeland Security, Office of Inspector General, 110'/123' Maritime Patrol Boat Modernization Project, OIG -07-27, January 2007. The report is available online at [\[http://www.dhs.gov/xoig/assets/mgmttrpts/OIG\\_07-27\\_Feb07.pdf\]](http://www.dhs.gov/xoig/assets/mgmttrpts/OIG_07-27_Feb07.pdf).

<sup>21</sup> U.S. Department of Homeland Security, Office of Inspector General, *Major Management Challenges Facing the Department of Homeland Security (Excerpts from the FY 2006 DHS Performance and Accountability Report)*, December 2006. (OIG-07-12) p. 6.

testing procedures, the contractor has not followed them consistently to ensure that C4ISR systems and the assets on which they are installed perform effectively.

Additionally, the Coast Guard faces several challenges to implementing effectively its Deepwater C4ISR systems. Due to limited oversight as well as unclear contract requirements, the agency cannot ensure that the contractor is making the best decisions toward accomplishing Deepwater IT goals. Insufficient C4ISR funding has restricted accomplishing the “system-of-systems” objectives that are considered fundamental to Deepwater asset interoperability. Inadequate training and guidance hinder users from realizing the full potential of the C4ISR upgrades. Instituting effective mechanisms for maintaining C4ISR equipment have been equally challenging.<sup>22</sup>

A December 2006 DHS IG report on major DHS management challenges reiterated these points.<sup>23</sup>

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<sup>22</sup> U.S. Department of Homeland Security, Office of Inspector General. *Improvements Needed in the U.S. Coast Guard’s Acquisition and Implementation of Deepwater Information Technology Systems*, August 2006. (Office of Information Technology, OIG-06-55) p. 1.

<sup>23</sup> U.S. Department of Homeland Security, Office of Inspector General, *Major Management Challenges Facing the Department of Homeland Security (Excerpts from the FY 2006 DHS Performance and Accountability Report)*, December 2006. (OIG-07-12) p. 13.

## Appendix C: GAO Testimony

At a February 14, 2007, hearing on the Deepwater program before the Oceans, Atmosphere, Fisheries, and Coast Guard subcommittee of the Senate Commerce, Science and Transportation Committee, GAO testified in part:

In 2001, we described the Deepwater program as “risky” due to the unique, untried acquisition strategy for a project of this magnitude within the Coast Guard. The Coast Guard used a system-of-systems approach to replace deteriorating assets with a single, integrated package of aircraft, vessels, and unmanned aerial vehicles, to be linked through systems that provide command, control, communications, computer, intelligence, surveillance, and reconnaissance (C4ISR), and supporting logistics. In a system-of-systems, the delivery of Deepwater assets are interdependent, thus schedule slippages and uncertainties associated with potential changes in the design and capabilities of any one asset could increase the overall risks that the Coast Guard might not meet its expanded homeland security performance requirements within given budget parameters and milestone dates. The Coast Guard also used a system integrator — which can give the contractor extensive involvement in requirements development, design, and source selection of major system and subsystem subcontractors. The Deepwater program is also a performance-based acquisition, meaning that it is structured around the results to be achieved rather than the manner in which the work is performed. If performance-based acquisitions are not appropriately planned and structured, there is an increased risk that the government may receive products or services that are over cost estimates, delivered late, and of unacceptable quality.

Our reported concerns and related recommendations in 2004 and in subsequent assessments in 2005 and 2006 have centered on three main areas: program management, contractor accountability, and cost control through competition. In the area of program management, among other things, our prior work has found that Integrated Product Teams (IPTs) — the Coast Guard’s primary tool for managing the program and overseeing the contractor — have struggled to effectively carry out their missions. We recommended that, among other things, Coast Guard improve the IPTs by initiating actions to establish timely charters and training. In terms of contractor accountability, in 2004 we found that the Coast Guard had not developed quantifiable metrics to hold the system integrator accountable for its ongoing performance, the process by which the Coast Guard assessed performance after the first year of the contract lacked rigor, and the Coast Guard had not begun to measure the system integrator’s performance on the three overarching goals of the Deepwater program — maximizing operational effectiveness, minimizing total ownership costs, and satisfying the customer. Thus, one recommendation we made for improving contractor accountability was to devise a time frame for measuring the contractor’s progress toward improving operational effectiveness. We also reported in 2004 that, although competition among subcontractors was a key vehicle for controlling costs, the Coast Guard had neither measured the extent of competition among the suppliers of Deepwater assets nor held the system integrator accountable for taking steps to achieve competition. Consequently, we recommended that Coast Guard develop a plan to hold the contractor accountable for ensuring adequate competition among suppliers. While we recognize that the Coast Guard has taken steps to address our findings and recommendations, aspects of the Deepwater program will require continued attention.

In addition to the Deepwater program management issues discussed above, the Coast Guard is facing operational challenges because of performance and design problems with Deepwater patrol boats. Specifically, the conversion of legacy 110-foot patrol boats to upgraded 123-foot patrol boats was stopped at eight hulls (rather than the entire fleet of 49) due to deck cracking, hull buckling, and shaft alignment problems. These patrol boat conversion problems ultimately led the Coast Guard to suspend all normal operations of the eight converted 123-foot patrol boats on November 30, 2006. The Coast Guard is now exploring options to address the resulting short-term operational gaps. There have also been design problems with the new Fast Response Cutter (FRC), intended to replace all 110-foot and 123-foot patrol boats. In February 2006, the Coast Guard suspended design work on the FRC due to design risks such as excessive weight and horsepower requirements.<sup>3</sup> In moving forward with the FRC acquisition as planned, the Coast Guard will end up having to operate two classes of FRCs — which has resulted in a slippage of the anticipated FRC delivery date. One class will be based on an adapted design from a patrol boat already on the market and another class that would be redesigned to address the problems in the original FRC design plans. Thus, the Coast Guard is also facing longer-term operational gaps related to its patrol boats. As with the 123-foot patrol boats, the Coast Guard is looking at options to address these long-term operational gaps....

Some of the problems the Coast Guard is experiencing with the Deepwater program (as discussed later in this statement), in principle, are indicative of broader and systemic challenges we have identified for complex, developmental systems. These challenges, based mostly on our reviews of Department of Defense programs, include:

- Program requirements that are set at unrealistic levels, then changed frequently as recognition sets in that they cannot be achieved. As a result, too much time passes; threats may change; and/or members of the user and acquisition communities may simply change their minds. The resulting program instability causes cost escalation, schedule delays, fewer quantities, and reduced contractor accountability.
- Program decisions to move into design and production are made without adequate standards or knowledge.
- Contracts, especially service contracts, often do not have measures in place at the outset in order to control costs and facilitate accountability.
- Contracts typically do not accurately reflect the complexity of projects or appropriately allocate risk between the contractors and the taxpayers.
- The acquisition workforce faces serious challenges (e.g., size, skills, knowledge, and succession planning).
- Incentive and award fees are often paid based on contractor attitudes and efforts versus positive results, such as cost, quality, and schedule.
- Inadequate government oversight results in little to no accountability for recurring and systemic problems.

Our assessment of the Deepwater program in 2004 found that the Coast Guard had not effectively managed the program or overseen the system integrator.<sup>6</sup> We specifically made 11 recommendations to the Coast Guard.... Our reported concerns in 2004 and in subsequent assessments in 2005 and 2006 have centered on three main areas: program management, contractor accountability, and cost control through competition. Each of these three areas is discussed in more detail below. While we recognize that the Coast Guard has taken steps to address our findings and recommendations, aspects of the Deepwater program will require continued attention. A project of this magnitude

will likely continue to experience other problems as more becomes known. We have ongoing work to monitor and evaluate the Coast Guard's efforts.

Our previous work and recommendations were based on concerns about the Coast Guard's program management. For example, we reported in 2004 that the Coast Guard had not adequately communicated to its operational personnel decisions on how new and old assets would be integrated and how maintenance responsibilities would be divided between government and contractor personnel. We also found that the Coast Guard had not adequately staffed its program management function. Despite some actions taken to more fully staff the Deepwater program, we reported that in January 2005 shortfalls remained. While 244 positions were assigned to the program, only 206 were filled, resulting in a 16 percent vacancy rate.

One of the key program management concerns we had, and one that is worth highlighting, is the effectiveness of IPTs. IPTs are the Coast Guard's primary tool for managing the Deepwater program and overseeing the system integrator. Our past work has found that IPTs can improve both the speed and quality of the decision-making process. They can make decisions involving significant trade-offs without relying unduly on other organizations for information or approval.<sup>7</sup> In our prior work, we studied successful IPTs in commercial firms and found that effective teams have (1) expertise to master different facets of product development, (2) responsibility for day-to-day decisions and product delivery, (3) key members who are either physically collocated or connected through virtual means to facilitate team cohesion and the ability to share information, and (4) control over their membership, with membership changes driven by each team's need for different knowledge.

We identified two elements as essential to determining whether a team is in fact an IPTs: the knowledge and authority needed to recognize problems and make cross-cutting decisions expeditiously. Knowledge is sufficient when the team has the right mix of expertise to master the different facets of product development. Authority is present when the team is responsible for making both day-to-day decisions and delivering the product. If the programs are experiencing problems, the teams either did not have the authority or the right mix of expertise to be considered IPTs. If a team lacks expertise, it will miss opportunities to recognize potential problems early; without authority, it can do little about them.

The Deepwater ITS — comprised of Coast Guard, ICGS, and subcontractor employees from Lockheed Martin and Northrop Grumman — are responsible for overall program planning and management, asset integration, and overseeing the delivery of specific Deepwater assets. We reported in 2004 that the teams had struggled to effectively carry out their missions. We identified four major issues that had impeded the effective performance of the ITS.

— First, the teams lacked timely charters to vest them with authority for decision making. More than merely a paperwork exercise, sound IPTS charters are critical because they detail each team's purpose, membership, performance goals, authority, responsibility, accountability, and relationships with other groups, resources, and schedules.

— Second, the system integrator had difficulty training IPTS members in time to ensure that they could effectively carry out their duties, and program officials referred to IPTS training as deficient. IPTS training is to address, among other

issues, developing team goals and objectives, key processes, use of a Web-based system intended to facilitate communication, and team rules of behavior. According to a Coast Guard evaluation report from December 2002, IPTS training had been implemented late, which contributed to a lack of effective collaboration among team members.

— Third, very few of the operating ITS were entirely collocated, (that is, all members were not in the same building) even though the Coast Guard's Deepwater program management plan identified collocation of IPTS members as a key program success factor, along with effective communications within and among teams. ICGS developed a Web-based system for government and contractor employees to regularly access and update technical delivery task order information, training materials, and other program information, in part to mitigate the challenges of having team members in multiple locations. However, the Deepwater program executive officer reported that, while the system had great potential, it was a long way from becoming the virtual enterprise and collaborative environment required by the contractor's statement of work.

— Fourth, we reported that most of the Deepwater ITS had experienced membership turnover and staffing difficulties, resulting in a loss of team knowledge, overbooked schedules, and crisis management. In a few instances, such as the national security cutter and maritime patrol aircraft, even the IPTS leadership had changed.

In 2005, we found that the Coast Guard had taken some positive steps in that (1) the ITS had been restructured, (2) 20 ITS had charters setting forth their purpose, authority, and performance goals, and (3) entry-level training had been implemented for team members. However, some of the problems continued. A Coast Guard assessment of the system integrator's performance found that roles and responsibilities in some teams continued to be unclear. Decision making was to a large extent stove-piped, and some teams lacked adequate authority to make decisions within their realm of responsibility. One source of difficulty for some team members was that each of the two major subcontractors has used its own management systems and processes to manage different segments of the program.

In 2005, we also noted that decisions on air assets were made by Lockheed Martin, while decisions regarding surface assets were made by Northrop Grumman. We reported that this approach can lessen the likelihood that a system-of-systems outcome will be achieved if decisions affecting the entire program are made without the full consultation of all parties involved. In 2006, we reported that Coast Guard officials believed collaboration among the subcontractors to be problematic and that ICGS wielded little influence to compel decisions among them. For example, when dealing with proposed design changes to assets under construction, ICGS submitted the changes as two separate proposals from both subcontractors rather than coordinating the separate proposals into one coherent plan. According to Coast Guard performance monitors, this approach complicates the government review of design changes because the two proposals often carried overlapping work items, thereby forcing the Coast Guard to act as the system integrator in those situations.

In 2004, we also made recommendations related to contractor accountability. We found that the Coast Guard had not developed quantifiable metrics to hold the system integrator accountable for its ongoing performance



and that the process by which the Coast Guard assessed performance after the first year of the contract lacked rigor. For example, the first annual award fee determination was based largely on unsupported calculations. Despite documented problems in schedule, performance, cost control, and contract administration throughout the first year, the program executive officer awarded the contractor an overall rating of 87 percent, which fell in the “very good” range. This rating resulted in an award fee of \$4.0 million of the maximum of \$4.6 million.

We also reported in 2004 that the Coast Guard had not begun to measure the system integrator’s performance on the three overarching goals of the Deepwater program — maximizing operational effectiveness, minimizing total ownership costs, and satisfying the customers. Coast Guard officials told us that metrics for measuring these objectives had not been finalized; therefore the officials could not accurately assess the contractor’s performance against the goals. However, at the time, the Coast Guard had no time frame in which to accomplish this measurement.

Further, our 2004 report had recommendations related to cost control. We reported that, although competition among subcontractors was a key vehicle for controlling costs, the Coast Guard had neither measured the extent of competition among the suppliers of Deepwater assets nor held the system integrator accountable for taking steps to achieve competition. As the two major subcontractors to ICGS, Lockheed Martin and Northrop Grumman have sole responsibility for determining whether to provide the Deepwater assets themselves or to hold competitions — decisions commonly referred to as “make or buy.” We noted that the Coast Guard’s hands-off approach to make-or-buy decisions and its failure to assess the extent of competition raised questions about whether the government would be able to control Deepwater program costs.

We made 11 recommendations in 2004 in the areas of management and oversight, contractor accountability, and cost control through competition....

In April 2006, we reported that the Coast Guard had implemented five of the recommendations. Actions had been taken to

- revise the Deepwater human capital plan;
- develop measurable award fee criteria;
- implement a more rigorous method of obtaining input from Coast Guard monitors on the contractor’s performance;
- include in the contractor’s performance measures actions taken to improve the integrated product teams’ effectiveness; and
- [ — ] require the contractor to notify the Coast Guard of subcontracts over \$10 million that were awarded to the two major subcontractors.

The Coast Guard had begun to address five other recommendations by

- initiating actions to establish charters and training for integrated product teams;
- improving communications with field personnel regarding the transition to Deepwater assets;
- devising a time frame for measuring the contractor’s progress toward improving operational effectiveness;
- establishing criteria to determine when to adjust the project baseline; and
- developing a plan to hold the contractor accountable for ensuring adequate competition among suppliers.

In our April 2006 report, we determined that, based on our work, these recommendations had not been fully implemented.

The Coast Guard disagreed with and declined to implement one of our 11 recommendations: to establish a baseline to determine whether the system-of-systems acquisition approach is costing the government more than the traditional asset replacement approach.

We will continue to review Deepwater implementation and contract oversight. We are currently reviewing aspects of the Deepwater program for the House and Senate Appropriations Committees' Subcommittees on Homeland Security. As part of that effort, we will review the status of the Coast Guard's implementation of our 2004 recommendations on Deepwater contract management for improving Deepwater program management, holding the prime contractor accountable for meeting key program goals and facilitating cost control through competition. We will share our results with those committees in April of this year.

In addition to overall management issues discussed above, there have been problems with the performance and design of Deepwater patrol boats that pose significant operational challenges to the Coast Guard.

The Deepwater program's conversion of the legacy 110-foot patrol boats to 123-foot patrol boats has encountered performance problems. The Coast Guard had originally intended to convert all 49 of its 110-foot patrol boats into 123-foot patrol boats in order to increase the patrol boats' annual operational hours. This conversion program was also intended to add additional capability to the patrol boats, such as enhanced and improved C4ISR capabilities, as well as stern launch and recovery capability for a small boat. However, the converted 123-foot patrol boats began to display deck cracking and hull buckling and developed shaft alignment problems, and the Coast Guard elected to stop the conversion process at eight hulls upon determining that the converted patrol boats would not meet their expanded post-9/11 operational requirements.

The performance problems illustrated above have clear operational consequences for the Coast Guard. The hull performance problems with the 123-foot patrol boats led the Coast Guard to remove all of the eight converted normal 123-foot patrol boats from service effective November 30, 2006. The Commandant of the Coast Guard has stated that having reliable, safe cutters is "paramount" to executing the Coast Guard's missions. Thus, removing these patrol boats from service impacts Coast Guard's operations in its missions, such as search and rescue and migrant interdiction. The Coast Guard is exploring options to address operational gaps resulting from the suspension of the 123-foot patrol boat operations.

The FRC — which was intended as a long-term replacement for the legacy 110-foot patrol boats — has experienced design problems that have operational implications. As we recently reported, the Coast Guard suspended design work on the FRC due to design risks such as excessive weight and horsepower requirements. Coast Guard engineers raised concerns about the viability of the FRC design (which involved building the FRC's hull, decks, and bulkheads out of composite materials rather than steel) beginning in January 2005. In February 2006, the Coast Guard suspended FRC design work after an independent design review by third-party consultants demonstrated, among other things, that the FRC

would be far heavier and less efficient than a typical patrol boat of similar length, in part, because it would need four engines to meet Coast Guard speed requirements.

One operational challenge related to the FRC, is that the Coast Guard will end up with two classes of FRCs. The first class of FRCs to be built would be based on an adapted design from a patrol boat already on the market to expedite delivery. The Coast Guard would then pursue development of a follow-on class that would be completely redesigned to address the problems in the original FRC design plans. Coast Guard officials now estimate that the first FRC delivery will slip to fiscal year 2009, at the earliest, rather than 2007 as outlined in the 2005 Revised Deepwater Implementation Plan. Thus, the Coast Guard is also facing longer-term operational gaps related to its patrol boats. In regard to the suspension of FRC design work, as of our June 2006 report, Coast Guard officials had not yet determined how changes in the design and delivery date for the FRC would affect the operations of the overall system-of-systems approach.

We will continue to review Coast Guard operational challenges related to Deepwater patrol boats. Our ongoing work for the House and Senate Appropriations Committees' Subcommittees on Homeland Security includes a review of the history of the contract, design, fielding, and grounding of the converted 123-foot patrol boats and operational adjustments the Coast Guard is making to account for the removal from service of the 123-foot patrol boats.<sup>24</sup>

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<sup>24</sup> Government Accountability Office, *Coast Guard[:] Coast Guard Efforts to Improve Management and Address Operational Challenges in the Deepwater Program*, Statement of Stephen L. Caldwell, Acting Director Homeland Security and Justice Issues, Testimony Before the Subcommittee on Oceans, Atmosphere, Fisheries, and Coast Guard, Committee on Commerce, Science and Transportation, U.S. Senate, GAO-07-460T, February 14, 2007.

## Appendix D: Coast Guard Testimony

At a February 14, 2007, hearing on the Deepwater program before the Oceans, Atmosphere, Fisheries, and Coast Guard subcommittee of the Senate Commerce, Science and Transportation Committee, the Coast Guard testified in part:

Despite the challenges that Deepwater has experienced, the Coast Guard has been the beneficiary of significant program accomplishments, including:

- command, control and sensor (C4ISR) upgrades to all 39 medium and high endurance cutters and at Communications Area Master Station Atlantic (CAMSLANT);
- the December 2006 arrival of our first new HC-144A Maritime Patrol Aircraft, currently undergoing installation of mission pallets in Elizabeth City, NC, to be followed shortly by delivery and missionization of the second and third airframes;
- commencement of our HC-130J missionization program, with scheduled first delivery in 2007;
- upcoming ribbon cutting ceremonies for new Deepwater shore facilities, including a surface ship training center in Petaluma, California, and a hangar to house HC-144As in Mobile, Alabama; and
- continuation of the Mission Effectiveness Programs for 110' patrol boats and for 270' and 210' medium endurance cutters, projects funded by Deepwater and managed by the Coast Guard Acquisition Directorate.

Additional milestones include the launch and christening last fall of the first of eight planned National Security Cutters, along with the keel authentication ceremony for the second, which fittingly took place on September 11, 2006. These particular achievements in shipbuilding are especially noteworthy in light of the impacts of the 2005 hurricane season when Hurricanes Katrina and Rita came ashore along the Gulf Coast, upending lives, severely damaging shipbuilding facilities, and further challenging the program. Construction of the NSCs continues and we appreciate the efforts of shipyard workers and Coast Guard men and women in keeping production of these important vessels moving forward. I firmly believe the NSC will provide a great contribution to the Coast Guard and the nation.

Eighty-four of 95 HH-65 helicopters will have been re-engined and converted to Charlie models by June 2007, enabling operators to routinely perform missions they could not have attempted before, including remaining aloft for longer periods and having the ability to carry greater loads as was demonstrated during Hurricane Katrina rescues.

The Coast Guard and ICGS, Deepwater's systems integrator, are leveraging sound principles of systems engineering and integration to derive high levels of sub-system and component commonality, improve interoperability with the U.S. Navy and other agencies, and achieve significant cost avoidances and savings. This approach conforms with and directly supports the National Fleet Policy.

Beginning in 2002, the Program Executive Officer of Deepwater formalized a collaborative partnership with his Navy and Marine Corps counterparts in order to identify common systems, technologies and processes for improved interoperability. By incorporating common and interoperable Navy systems into Deepwater assets, the Coast Guard has also avoided paying unnecessary costs.

As examples, the National Security Cutter and Off-Shore Patrol Cutter will use 75 percent of the Navy's AEGIS Command and Decision System. Deepwater assets also will incorporate Navy Type/Navy Owned systems, including the 57-mm deck gun, selected for major Deepwater cutters and the Navy's Littoral Combat Ship and DD(X) programs. The Operation Center Consoles on the NSC use 70 percent of the design of the Navy's Display Systems (AN/UYQ-70). And, by using more than 23,000 lines of software code from the Navy's Antisubmarine Warfare Improvement Program (AIP) in the CASA Maritime Patrol Aircraft's command and control systems, we are maximizing the use of mission systems that are installed on more than 95 percent of the world's maritime surveillance aircraft. The CASA Maritime Patrol Aircraft will utilize more than 50 percent of the functionality of the Navy's P-3 AIP system. Navy and Coast Guard personnel even train side-by-side at the Coast Guard's training facility in Petaluma, California.

We work closely with the Navy's Operational Test and Evaluation Force (COMOPTEVFOR). Currently, the Naval Air Systems Command staff is assisting us in evaluating the way ahead for Deepwater's VUAV project. We routinely rely on the expertise of Naval Sea Systems Command for a variety of assessments. Personnel from the Navy Supervisor of Shipbuilding Office (SUPSHIP) are assigned to our Program Management Resident Office (PMRO) in Pascagoula, MS, where they are supporting construction of the NSC at Northrop Grumman Ship Systems.

Looking to the future, there are many other opportunities for the Coast Guard and Navy to build on today's rich partnership in the design and delivery of the National Fleet in support of the National Strategy for Maritime Security. Potential areas for future cooperation include the design of the offshore patrol cutter, unmanned aerial vehicles, and common systems for weapons, sensors, and propulsion. Evaluations of sub-systems should include both the equipment and crewing support (e.g., crew composition aligned with capabilities required for a deployment). The collaborative development of LCS mission modules for coastal surveillance and port security missions also offers the potential for greater partnership in an operational mission area shared by both services.

#### Challenges in Program Execution

The innovative Deepwater program is large and complex and we have faced some challenges. Our performance-based acquisition strategy has created unique contracting and management challenges for the Coast Guard and our industry partners. In my view, some of these come from the need for an integrated Coast Guard, that unifies our technical authority, requirements owner, and our acquirers in a way that allows early and efficient adjudication of problems and ensures transparency so that Coast Guard would be capable of working successfully with ICGS on a simultaneous and complex acquisition of this size. We knew early on that this acquisition would be transformational for our Service, but we have to actively manage that transformation and not allow this acquisition to manage us. We are aggressively tackling and correcting these problems.

And clearly, we have experienced some failures in the Deepwater Program. The planned conversion of 110-foot patrol boats to 123 feet as a bridging strategy until new assets came online to fill the patrol gap has failed. Early on, we experienced hull problems with the first eight patrol boats that had been

converted and halted the project in May 2005. Technical problems continued in spite of multiple attempts at repair.

Last November, new problems were discovered, and I made the decision to suspend operation of our 123-foot patrol boats until we determine whether a technical fix is possible and economically prudent. Removing these boats from service was a difficult decision and has added to our critical gap in patrol boat hours. I know that this is of great concern to each of you. I assure you that I, too, am concerned - my highest priority is to mitigate and fill this gap as quickly as possible with the most capable assets.

To that end, I have directed my senior staff to aggressively examine and recommend ways we can use current resources to mitigate the loss of the 123-foot patrol boats. In response and as partial mitigation of the impact, we:

- began multi-crewing eight of our existing 110-foot patrol boats;
  - increased their operational tempo;
  - redeployed and surged assets to areas of greatest need, based upon risk;
  - secured continued use of three PC 179s from the Navy;
  - are aggressively examining the purchase of additional 87-foot patrol boats;
- and
- are compressing the 110' WPB Mission Effectiveness Project (MEP) schedule to reduce operational impacts.

The Coast Guard will do whatever is necessary to ensure that our maritime borders are secure and we can respond to existing and emergent requirements.

The failure of the 123-foot patrol boat project is unacceptable. I have established a group of legal, contracting, and engineering experts to examine the process at all stages, from beginning design work until we tied up the boats. I have directed this group to establish responsibility and propose measures to prevent similar problems in the future. We will work aggressively with ICGS to reach resolution and put this behind us.

When problems arose with the 123-foot patrol boats, the Coast Guard realized a need for additional patrol boats sooner than the original plan called for. After examining a series of options, we decided to move construction of the FRC forward on the overall Deepwater timeline. However, early tank testing showed technical risks with the initial FRC composite hull design; prudence required suspending the design and development while we considered the way ahead.

Ultimately, we decided to implement a “dual path” approach to acquire a fully capable patrol boat while expediting delivery. First, we took a step back from the initial FRC design to more thoroughly examine both its design and the composite hull technology that the design incorporated. We are completing a bottom-up business case analysis on what we have termed the “FRC-A Class” to provide an “apples to apples” look at composite versus steel hulls. Results from this analysis should be available later this month. Additionally, we had a technology readiness assessment performed to review critical technology elements associated with a composite-hulled design. Initial findings from this assessment indicate that necessary critical technology elements do not yet support immediate production of a composite-hulled patrol boat.

Clearly with this design review, the FRC-A Class path doesn't get boats into the fleet as quickly as needed. As an interim solution, the Coast Guard is

simultaneously working to acquire a “parent craft” design based on a vessel already in operation; one that will require minimal modifications to meet our basic mission requirements. We call this our Replacement Patrol Boat or “FRC-B Class.” After a good, hard look at the market to determine whether adequate boats exist to support a parent craft approach, we issued a Request for Proposal for such a vessel to ICGS. We expect a design proposal no later than March 31st of this year that will support delivery of the first FRC-B Class in the first half of FY 2010.

Turning to the National Security Cutter (NSC), I would like to clarify reports of structural problems. The DHS OIG recently concluded an audit of the NSC which highlighted concerns with our approach to potential structural integrity issues with the NSC hull. The issue here, which we have communicated to DHS OIG and which we have been actively addressing for several years, is a question of fatigue life over the course of the cutter’s 30-year service life. There has never been a question of safety related to the ship’s structure, nor have we ever anticipated any operational restrictions related to its design. As you are well aware, we drive our ships hard, so service and fatigue life of new cutters is of critical concern to us.

An early Coast Guard review of the design of the NSC indicated that the ship might experience fatigue-level stresses sooner than anticipated. Because we want to ensure that all of our ships meet the service and fatigue life requirements our missions demand, we are implementing changes and enhancements to the design of the NSC.

Some have wondered why we didn’t suspend construction of the first NSC when we learned of these concerns. The Coast Guard’s decision to continue production of the NSC reflects more than simply the naval engineering perspective. They also encompass considerations of cost, schedule, and performance. After extensive research and deliberation and with all of these considerations in mind, the Coast Guard decided that the need for enhancements to NSC #1 could be effectively addressed by later retrofits and did not justify the schedule and cost risk associated with stopping the production line. These kinds of issues are not unusual in production of a first-in-class vessel, and I believe the decision to move forward was prudent. We will fix NSC #1 and 2 and design the fix into future hulls’ production.

To minimize future delays and disruption resulting from these kinds of design and technical concerns, I:

- reaffirmed in writing the role of the Coast Guard’s chief engineer as the technical authority for all acquisition projects;
- directed independent, third-party design reviews as new assets are developed or major modifications to assets are contemplated; and
- am working to expand our relationship with the Naval Sea and Air Systems Commands to leverage outside technical expertise.

We’ve learned from this experience. Adjudication of technical concerns within the Coast Guard could have been accomplished more efficiently. Existing organizational barriers made it harder for us to jointly address concerns and develop mutually acceptable solutions. We also could have been more proactive in informing Congress-and this Subcommittee-about fatigue concerns. One of my axioms is that “transparency of information breeds self-correcting behavior;” I assure you that as we move forward that transparency will be my watchword.

## The Way Ahead

The Deepwater Program Executive Officer, Rear Admiral Gary Blore, has already undertaken a number of independent reviews, including the comprehensive business case analysis and technology readiness assessment for the FRC-A Class just mentioned. Of particular note, we contracted with the Defense Acquisition University (DAU) in 2006 to conduct a “quick-look” review of Deepwater to examine the program’s key management and technical processes, performance-based acquisition strategy, organizational structure and our government/industry “partnership” contract. The USCG Research and Development Center is conducting a study and will provide recommendations for the way ahead on the planned Deepwater Vertical-Launch Unmanned Aerial Vehicle (VUAV), and we’ve initiated an independent review of workload and workforce management issues. Based on these findings and recommendations, we will make “course corrections” where needed in order to lead an efficient organization and guarantee successful execution of the Deepwater Program.

As I mentioned earlier, many of the challenges within the Deepwater Program stem from the lack of an integrated Coast Guard acquisition program to manage this system-of-systems acquisition, as well as to conduct effective oversight to Integrated Coast Guard Systems. We have developed an initial Blueprint for Acquisition Reform, and in the coming months, you will see significant changes inside the Coast Guard’s acquisition directorate to bring all acquisition efforts — traditional as well as system-of-systems — under one organization. Rear Admiral Blore will become the Coast Guard’s Chief Acquisition Officer, with responsibility over all procurement projects. The Program Executive Officer for Deepwater will work within the new organization. I have directed Rear Admiral Ron Rabago, a naval engineer, former Commanding Officer of the Coast Guard Yard, and a technical expert on naval engineering issues to take Deepwater’s “helm.” Consolidating our acquisition efforts will provide immediate benefits, including better allocation of contracting officers and acquisition professionals, and an integrated product line approach to our management of acquisitions, thereby allowing projects to be handled by the same people, with the same expertise and the same linkages to the technical authorities.

Additional efforts are underway within Deepwater and the Coast Guard to develop more appropriate staffing in order to efficiently obligate program funding and ensure successful delivery of needed assets to the fleet. We’re reinvigorating our acquisition training and certification process to ensure that Deepwater staff, program managers and contracting officers have the requisite skills and education needed to manage this complex program. Our desired end state is to become the model for mid-sized federal agency acquisition and procurement, in full alignment with the Department of Homeland Security acquisition activities.

DAU’s recent Quick Look Study of the Deepwater program concluded that our initial Blueprint for Acquisition Reform “is comprehensive and responsive to the human capital, organization, process and governance related findings and recommendations” in its report.

## Cost Change and Contractor Oversight



In discussing these challenges and my actions to address them, I need to mention two concerns raised in recent media coverage of the Deepwater program: the first is cost growth, the second is contract oversight. Much of what's been reported in the press as "cost overruns" simply does not tell the full story. There is obvious truth to claims of programmatic cost increases. As noted, the original Deepwater plan was estimated to cost \$17 billion and now we're projecting a \$24 billion cost over 25 years. However, it is imperative to understand that the main driver of these cost increases was the complete revision of the original plan to meet post 9/11 mission requirements. New missions meant that we needed more capable assets which cost more to acquire and build.

In addition to improved mission capabilities, Hurricanes Katrina and Rita hit the Gulf Coast shipyard industry hard during production of the first National Security Cutter, flooding the hull and causing extensive damage to the facility. The impacts to industry - even just in terms of rebuilding a skilled, sufficient workforce - should not be underestimated. The tragedy was real (I can personally attest to this) and contributed to cost increases and some schedule slippage for the cutter. That these impacts were not greater speaks volumes about the dedication of the shipbuilding industry and its employees along the Gulf Coast.

Of course, we must remain vigilant regarding cost growth. However, I am committed to working with industry to develop and promote cost reduction measures and am personally engaged with the CEO's of Lockheed Martin and Northrop Grumman regarding my concerns.

I've also read that the Coast Guard is not in control of the Deepwater Program; that we've somehow abrogated our oversight responsibilities and handed industry the "keys to the vault." That is not true. The Coast Guard has been and remains fully involved in the management of this program and has made all final and critical decisions. When appropriate, the issues are briefed all the way up the chain of command to me, and I make the decision myself. And following recommendations from DHS auditors, we have taken steps to ensure that we accurately and thoroughly document such decisions for future reference.

We've redefined our award term and award fee criteria, making them more objective in order to improve contractor performance. As resources allow, the Coast Guard will assume greater responsibility as the system integrator, a role we now feel better positioned to take on.

It is critical that the senior leadership in each of our organizations meet regularly to be informed of the progress of this program so we can provide executive level oversight at all times, and specific direction when warranted. As a result, I am personally committed to doing all that I can to make this a successful starting point for further improvement in both the performance and relationships that exist within the Deepwater program, which is so vital to Coast Guard readiness.

We're on the Path to Change

In conclusion, we have learned some hard lessons and are implementing recommendations from the GAO and OIG to keep Deepwater moving forward. We are making significant progress and outfitting our fleet to meet 21st century threats and requirements.

I am confident the NSC is on the correct course, I'm convinced our FRC "dual path" approach is the best and fastest way to address the patrol boat gap, and I'm pleased that our Deepwater aviation assets are already making real contributions within the fleet. I look forward to the delivery of additional assets and the operational capacity they will bring. They will close the existing aircraft and patrol boat gaps so that we can best protect our maritime borders and tend to the nation's business at sea.

I know you're anxious for results; I am too, and I assure you nobody is as anxious as the men and women of the Coast Guard. We are on the path to change, and we will not stop until Coast Guard has the tools it needs to protect America.

I am the Commandant of the Coast Guard, I am responsible, I will do this right.<sup>25</sup>

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<sup>25</sup> Department of Homeland Security, U.S. Coast Guard, Statement of Admiral Thad W. Allen, Commandant, on the Recent Setbacks to the Coast Guard Deepwater Program, Before The Subcommittee on Oceans, Atmosphere, Fisheries and Coast Guard, Committee on Commerce, Science & Transportation, U.S. Senate, February 14, 2007.

## Appendix E: NGSS Testimony

At a February 14, 2007, hearing on the Deepwater program before the Oceans, Atmosphere, Fisheries, and Coast Guard subcommittee of the Senate Commerce, Science and Transportation Committee, Northrop Grumman Ship Systems (NGSS), one of the two firms involved in the joint venture that is the LSI for the Deepwater program, testified in part:

Overall Deepwater Program Management: On June 25, 2002, the Deepwater Program prime contract was awarded to ICGS. As program requirements have changed since 9/11, the Deepwater prime contract has been amended accordingly to accommodate the new requirements in support of national security.

There has been an extraordinary level of transparency in program management and execution between ICGS and the Coast Guard. The Coast Guard has been involved in every aspect of the Program throughout its history. Each Deepwater asset undergoes design reviews by government and contractor technical experts at key points in the design life cycle, with questions and issues adjudicated as part of the review process. Personnel from the Coast Guard, Northrop Grumman, Lockheed Martin, various subcontractors and ICGS are co-located at production sites around the country as well as in the Systems Integration Program Office in Arlington, Virginia. Full participation by the Coast Guard is built into every level and function within the ICGS team. With respect to programmatic decision making, all major acquisition decisions are made by the Coast Guard, after review and approval by Coast Guard senior leadership through a series of cross-functional government teams. These include reviews by subject matter experts from Engineering and Logistics, Electronics & Communications, Human Resources, Intelligence, and the Programs & Budget Directorate at the staff and flag level. Northrop Grumman and ICGS do not make decisions in relation to what cutters and boats to buy—we make recommendations. The U.S. Coast Guard is the decision making and contracting authority, and has retained the traditional contract management functions, including the right to issue unilateral change orders, to stop or terminate work, to order or not order assets and supplies, and to accept or reject the work.

There is a lot of interest about the way forward for Deepwater. Leaders within the highest levels of the Coast Guard, Northrop Grumman and Lockheed Martin are committed and focused on the most important issues related to the 25-year, \$24 billion acquisition program, including recent Coast Guard initiatives to strengthen program management and oversight — such as technical authority designation, use of independent (third party) assessments, and consolidation of Coast Guard acquisition activities under one directorate. Objectives to achieve the way forward include: (1) Capitalize on proven, first-article Deepwater successes. (2) Sustain momentum in recapitalizing the Coast Guard through the Deepwater program and (3) Resolve outstanding challenges associated with some projects within Deepwater. The senior leadership in each of our organizations is committed to meet regularly to review the progress of the program and provide executive level oversight at all times, with specific direction when warranted.

Competition is also an important component of the Deepwater team's effort to deliver "best value" to the Coast Guard. The tenet of competition within the ICGS Deepwater program plan is an open business model that invites

participation and competition through the life of the program. Both contractors have a Contractor Purchasing System that is patterned after the Federal Acquisition Regulations. All Northrop Grumman purchases over \$25K are individually reviewed for compliance with purchasing guidelines, and the purchasing system is audited (usually every three years) by the Defense Contract Audit Agency (DCAA). A government sponsored third party review of Deepwater acquisition practices found our statistics favorable compared to large US Navy procurement programs. In addition, competition for subcontract awards is encouraged via the annual Industry and Innovation Days where suppliers and vendors have an opportunity to provide input on new or improved products. ICGS to date has placed orders with more than 600 suppliers representing more than 41 states and maintains an active database of over 3000 potential suppliers from which it draws to host annual supplier innovation and industry days.

Patrol Boats are small naval ships, generally designed for coastal defense duties, operated by a nation's navy, coast guard or police force in marine - "blue water" - and littoral and river - "brown water" - environments. They are commonly found in various border protection roles, including anti-smuggling, anti-piracy, fisheries patrols, immigration law enforcement and rescue operations. Patrol boats usually carry a single artillery gun as main armament with a variety of lighter secondary armament such as machine guns, and are diesel-powered, with speeds generally in the 25-30 knot range. The above definition aptly describes the 49 "Island Class" 110 foot patrol boats and the 123 foot conversions under the original Deepwater proposal.

The Coast Guard's current 110 foot patrol boats were built in the 1980s and early 1990s by Bollinger Shipyards, Inc. These boats have seen extensive duty in support of the Coast Guard mission to save lives, interdict aliens and seize drugs. ICGS and its teammate, Halter Bollinger Joint Venture (HBJV), proposed to convert the 110 foot boats to 123 foot boats as an interim measure to improve the capability and extend the life of this vessel until its FRC replacement entered operation in 2018. ICGS proposed the conversion concept as the best means to provide the Coast Guard with the necessary capability to continue to meet its mission objectives while remaining within the confines of program funding requirements. Deepwater competitors were required to propose a "system of systems" solution that did not exceed the funding limitation of \$500 million per year. With new assets such as the National Security Cutter (NSC), Maritime Patrol Aircraft (MPA) and the Vertical Unmanned Air Vehicle (VUAV) being developed early in the program, it was not possible to design, develop and construct new patrol boats at program inception while keeping within annual funding limitations.

Bollinger had designed and built the original 110 foot boats and was very familiar with their construction. Bollinger was awarded a contract for 16 110 Island class boats in August 1984 and another contract for 33 more boats in 1986. The design of the 110 Island class was approximately 20 years old and was based on an existing patrol boat developed by a British firm, Vosper Thornycroft (UK) Ltd. The 110 Island Class boats were commissioned between November 1985 and 1992. Notably, after the first boats came into service, it was discovered that the 110s suffered from hull problems when operated in heavy seas. As a correctional measure, heavier bow plating was added to hulls 17 through 49 during construction and additional stiffeners were retrofitted to earlier hulls.

Under the proposed Deepwater conversion plan, HBJV added a 13 foot extension to the 110', which accommodated a stern ramp for the launch and recovery of a small boat, used primarily to support boarding and rescue operations. In addition, the conversion installed an improved pilot house, enhanced Command, Control, Communications, Computers and Intelligence, Surveillance and Reconnaissance (C4ISR) capabilities and tested, identified and renewed hull plating in areas where an ultrasonic thickness inspection indicated that the existing plating was deteriorated.

At the time the proposal was submitted, some general knowledge about the condition of the 110s was available, and ICGS believed that replacement of the hull plating would adequately address and offset their deteriorated condition. This is consistent with the findings of the Coast Guard's 110 WPB Service Life Extension Board, published in March 2002, which recommended a program of systematic hull repairs, predominantly in documented problem areas, to address the hull deterioration problems that were impacting 110' WPB operational availability.

After being awarded the patrol boat conversion work, ICGS engaged in a rigorous design process that included extensive reviews with all stakeholders. These programmatic reviews included a Preliminary Design Review, a Critical Design Review and a Production Readiness Review all of which were conducted with the Coast Guard before the actual conversion work began. Leading up to each of these reviews, the evolving design, design drawings and calculations were formally presented to the Coast Guard subject matter experts in increasing detail for their review, comment and approval. During this series of reviews I am not aware that structural, buckling or deformation concerns were raised as an issue. In addition, during the conversion of the Matagorda, the American Bureau of Shipping (ABS) examined the design of the hull extension and new deckhouse and monitored key elements of the work being performed. At the conclusion of the Matagorda work, they issued a letter of approval for the conversion work and expressed no reservations with the feasibility of the conversion.

The Performance Specification requirement calls for the 123' to be capable of unrestricted operation up through sea state 3, or seas averaging less than four feet. Operation restrictions are imposed beginning at sea state four, or seas less than eight feet, where the boats are to be able to sustain limited operations, altering course or reducing speed as required to maintain a ride which does not damage the boat or its machinery or overly fatigue the crew. The 123' is to be able to survive sea state 5, or seas averaging between eight and 13 feet, maneuvering as necessary to minimize damage or injury to the crew, and then be capable of returning to port under its own power once the seas have subsided.

In September of 2004, after all 8 hulls had entered the conversion program and the first 4 hulls had been delivered, the Matagorda was forced to conduct a high speed transit to avoid Hurricane Ivan. This operational necessity forced the Coast Guard to transit in a sea state and speed where the cutter was operating near or above the design limits of the 123' conversion. Upon arrival at their destination, the crew discovered buckling of the side shell and main deck on the starboard side near midships. An engineering tiger team was formed consisting of Coast Guard and NGSS personnel. This team was dispatched to investigate the problem where it was discovered that the Matagorda had an inherent workmanship issue in the baseline 110' that existed prior to the conversion and contributed to the hull buckling. Specifically, a hidden, unwelded aluminum

deck stringer was discovered immediately beneath the area where the failure occurred. Other boats were examined, and this unwelded stringer was also found on one additional hull undergoing conversion. When modeled using finite element analysis, the stresses in the panels which failed on Matagorda were significantly higher than the stresses shown when the model was run with this stringer intact. Based on this finding, the team believed this to be the primary cause of the buckling on Matagorda, and repairs were made accordingly.

In addition, a reconstruction of the engineering analysis of the 123' structure was conducted. Based on this, it was also discovered that an early calculation overstated the strength margin for the boat. A revised calculation using a common, agreed to set of assumptions by the engineering team showed the 123' would still meet the required operations defined in the Performance Specification.

In an effort to further improve the structural integrity on the 123', three stiffener bands were installed; one at the upper edge of the side shell, one below this one and another on the edge of the main deck to increase the overall structural strength. While the finite element analysis and conventional calculations both agreed that the original hull, with the stringer under the deck intact, should be sufficient throughout the operating range of the 123', these additional stiffeners were considered to provide an added margin of strength.

In November 2004, ICGS received a contract modification that changed the arrival schedule of hulls 9-12 to TBD. Long-lead time material for four additional hulls had already been authorized and work continued on the 3 remaining hulls in process.

By March, 2005, 6 of the 123s had received the structural upgrade and had been delivered. Certain operational restrictions imposed on these boats by the Coast Guard following repairs to the Matagorda had been lifted. Then, during a transit from Key West to Savannah, GA, the Nunivak experienced hull deformation in an area aft of the new reinforcing straps. This deformation occurred in a different area from that of the Matagorda. Further, this was not an area which had indicated potential for high stresses under any conditions modeled in the earlier finite element analysis.

An outside engineering firm, Designers and Planners, was contracted by the Coast Guard to perform a more detailed finite element analysis of the 123' hull, which showed that the overall hull structure design was adequate under all expected operating conditions up to the worst operating condition modeled. The analyses were not able to replicate the deformation seen on Nunivak. A more detailed look at specific regions on the hull showed an area with high potential for localized buckling in a section of the side shell where the original 110' hull had been constructed of exceptionally thin four-pound plate. Despite this finding, no actual failures had ever been experienced in this area on 110 or 123' WPBs. As a precaution, this thin plate was replaced with heavier plating on those cutters undergoing the Post Delivery Maintenance Availability, with plans to eventually upgrade all the boats. Lastly, a metallurgical analysis of the deck material determined that the particular grade of aluminum used on the 110s is prone to corrosion and cracking in elevated heat and marine conditions.

In July 2005, then Coast Guard Commandant Admiral Collins' written testimony before Congress outlined the twofold reason for stopping the

conversion process as follows: “As the first eight 110’ to 123’ conversions were conducted, the Coast Guard found that the 110’ WPB hulls were in much worse condition than anticipated. This extended the conversion timeline and would have increased projected costs for conversions after the first eight (the first eight were negotiated under a firm-fixed-price contract). An operational analysis of the 123’ WPBs also identified high risks in meeting mission needs, particularly in the post-9/11 environment.”

To date the problems associated with the 123’ conversion include buckling or hull deformation and shaft and propeller alignment problems. In addition to the actions previously described, additional and substantial work has been (and continues to be) done. In addition to the repairs and reviews of structural calculations, we have continued the review process by conducting two independent finite element analyses, modeling both the original and the upgraded hull, and we completed metallurgical testing that revealed an issue in the main deck which exists on both the 123’ and across the legacy 110 fleet. Extensive strain gage testing has been conducted on a 123’ hull to validate the finite element model and to identify potential problem areas which the model may not show. The parent craft designer, Vosper Thornycroft, has been engaged to evaluate the 123’ hull and provide recommendations. Data is being collected on shaft alignment and maintenance procedures both during the conversion and since, so that the procedures for checking and correcting alignment can be validated for both the 110’ and the 123’. Elements of the 123’ design, including the propellers and the SRP stern-launch system are being reexamined and validated.

We are committed and determined to identify the root cause of the structural problems. Northrop Grumman and Coast Guard engineers are currently reviewing and re-reviewing all available data on the 110’ and 123’ patrol boats in an effort to better understand the cause or causes of both hull buckling and shaft and propeller alignment problems. Depending on the outcome of that analysis the possible outcomes range from removing the boats from service to effecting repairs with testing followed by placing them back in service. Until all analyses are complete, it is premature to speculate on the final cause and the final way forward.

Fast Response Cutter Acceleration: Before Congress in July 2005, then Coast Guard Commandant Collins testified: “A key component of the Deepwater Program is the replacement of the Coast Guard’s 110’ Island Class Patrol Boat (WPB) fleet. The Island Class patrol boat is a Coast Guard multi-mission workhorse and is rapidly approaching the end of its serviceable life. Under the initial IDS proposal, the 49 110’ Island Class WPBs were scheduled to undergo a conversion to 123’ WPBs by 2010 as a bridging strategy. The 123’ WPBs would then be replaced by the Fast Response Cutter (FRC) starting in 2018. As the first eight 110’ to 123’ conversions were conducted, the Coast Guard found that the 110’ WPB hulls were in much worse condition than anticipated. This extended the conversion timeline and would have increased projected costs for conversions after the first eight (the first eight were negotiated under a firm-fixed-price contract). An operational analysis of the 123 WPBs also identified high risks in meeting mission needs, particularly in the post-9/11 environment. The Coast Guard recently decided to stop the conversion project following the first eight conversions. Instead, the Coast Guard plans to advance the FRC design and construction by ten years, and is analyzing alternatives methods for extending the life of the 110-foot fleet, as discussed above.”

Consistent with this testimony, the Coast Guard accelerated FRC design and construction by ten years. The expanded set of post 9-11 requirements produced a set of required capabilities that exceeded the traditional patrol boat roles filled by the 110s and 123s and other similar worldwide patrol boat fleets. A market study was conducted and concluded that none of the existing similar sized patrol boats would meet these requirements. A series of business case analyses, Total Ownership Cost (TOC) studies and preliminary design efforts showed the benefits of using a composite hull form to meet this demanding set of requirements with a potential to save over \$1B in lifecycle cost. The predominate savings came from the superior service life of composites. The Design to Cost constraints restricted the vessel length to 140 feet. In order to accommodate the added capability and equipment required to meet the post 9/11 mission requirements the resultant design was wider for its length than historical and traditional patrol boat hull dimensions. Independent third party analysis by John J. McMullen and Associates (JJMA) stated: "The review team believes that the FRC does appear to meet or is capable of meeting the requirements" and acknowledges that "The FRC preliminary design represents a design solution to a challenging set of requirements." Additionally, I would like to point out that, contrary to what was reported in the press, the FRC-A did not fail a tank test - a preliminary test was conducted improperly. When this test conducted properly, the FRC-A met all requirements, as is confirmed in the final model test report.

The Coast Guard made the decision to suspend the FRC-A program, as the all composite design is now called, and focus on a parent craft solution known as the FRC-B. This decision seeks to ensure a proven solution to a lesser requirements set. This will enable the additional time required to take the FRC-A through a design spiral, and perform trade analyses to optimize performance to cost including a robust operational test program for the fully capable FRC. The Coast Guard is also performing an additional business case analysis and a technology readiness assessment to confirm viability of the composite approach.

The current patrol boat acquisition strategy includes two paths: FRC-A, mentioned above and FRC-B. FRC-B will leverage existing patrol boat designs to serve as a bridging strategy while the fully capable FRC-A is undergoing design and development. The FRC-B program will select the candidate design from a field of worldwide patrol boat providers and is expected to enter concept design later this year.

I want to assure the Committee that Northrop Grumman will continue to work with the Coast Guard in satisfying its patrol boat mission requirements throughout the life of the Deepwater Program.

National Security Cutter (NSC) Structure and Cost Growth: Designed to replace aging Hamilton Class High Endurance Cutters (WHEC) that have been in service over 40 years, the National Security Cutter (NSC) is a modern, well-armed, high-performance, 421-foot, 4000-ton frigate sized naval ship, with manned and unmanned aircraft, stern-launched rigid inflatable boats and secure communications facilities. It provides the Coast Guard with enhanced post 9/11 Homeland Security and core mission capabilities (drug interdiction, search & rescue, economic zone & fisheries protection). The first of the 8 ship class (USCGC Bertholf) has been launched and will be delivered to the Coast Guard in the fall of 2007. The second (USCGC Waesche) is also under construction and is scheduled for delivery to the Coast Guard in early 2009.



With regard to the structure, we believe the NSC meets contract requirements/specifications. The NSC design uses the same Data Design Sheet (DDS) standards used in structural design of ships since WWII. The NSC is designed to meet a 30 year service life and many of the structural items raised by the Coast Guard have been addressed and were incorporated in the Bertholf and Waesche (NSC 1 and 2) prior to production. For example, upgraded steel, thicker steel, modifications to Fashion Plates and Re-entrant Corners, and the addition of 2 longitudinal Hovgaard bulkheads to provide increased stiffness at the stern were incorporated into the design.

With regard to NSC fatigue life, even the best engineers will have different opinions. Analysis has been performed on the NSC utilizing a relatively new model developed by Naval Surface Warfare Center, Carderock Division (Carderock) utilizing two different approaches. The difference in the two approaches is whether or not the model is benchmarked by calculating the fatigue strength of proven ship designs with similar operational characteristics and hull form that has been at sea for the desired time. This enables the calculation of permissible stress levels that can be applied to test the new design. The results of these two analyses have generated a responsible dialog between the engineers which will lead to final agreement about enhancements to fatigue structure.

Northrop Grumman does not self-certify compliance with the structural requirements in the contract. The Bertholf has and will undergo a comprehensive internal and external certification process. The American Bureau of Shipbuilding (ABS) certified 14 Systems Level drawings, including structural design drawings. ABS will also certify 35 ship systems during this acceptance process. These include; Command & Control Systems, Propulsion Plant, Machinery Monitoring & Control, Fuel Systems, Anchoring Systems, and Steering Systems. During the design process, there will be a total of 46 independent third party certifications prior to or as part of the USCGC Bertholf (NSC 1) delivery process. These include; Final Aircraft Facilities, Flight Deck Status and Signaling, Navigation Systems, Interior Communications Systems, Guns and Ammunition Weapons System Safety, DoD Information Security and Accreditation, and TEMPEST. The US Navy's Board of Inspection and Survey (INSURV) will conduct the Ship's Acceptance Trials (AT) when the cutter gets underway later this year.

Cost growth has also been mentioned in the media. Two elements have led to the majority of cost growth on the NSC - increased post 9/11 requirements and the impact of Hurricane Katrina. The NSC that will be delivered to the Coast Guard this year is not the same ship that was first proposed in 1998. Today's NSC has greatly improved operational capabilities that address post 9/11 requirements including Chemical, Biological & Radiation (CBR) protection, a Sensitive Compartmented Information Facility (SCIF) and more robust aviation installations so that the NSC, in addition to its normal embarked Coast Guard aviation complement, will be able to launch, recover and operate US Navy, US Government Agency and partner nation manned and unmanned rotary wing aircraft. These enhancements have added approximately 1000 tons to the displacement, including a one third increase in electrical power systems, a tripling of air conditioning and ventilation capacity (HVAC), the addition of 25 antennas and a 26% growth in the size of the berthing spaces.

It is true that Katrina delayed the delivery of Bertholf by several months and added cost to the program. Prior to Katrina, Bertholf was the best "first of

class” ship in the 70 years that warships have been built in Pascagoula. Even taking into account Katrina, Bertholf continues to set new lead ship standards in quality and efficiency with, higher performance to standards than both the first or second Arleigh Burke Class (DDG 51) destroyer and labor utilization measures that routinely out perform other programs in our shipyard.

Much of what has been done on the NSC program is being transitioned to the rest of the shipyard to other construction programs. In addition to the specific actions as they relate to the NSC program, we are investing \$57.3 million dollars of our own money in a new suite of management tools that will increase our visibility, work sequencing capability, material and engineering modeling and capacity and resource planning. These tools will enable the reduction in the number of units we construct to build the NSC. Currently we build the vessel in 45 units and integrate these sub assemblies into 29 erection lifts on the ship. The new tool set will allow us to plan and construct the vessel in less lifts, our target is 16, and as we know the less number of lifts the less cost. We are investing in our human capital, process improvement, and our facilities to reduce the cost associated with building future ships.<sup>26</sup>

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<sup>26</sup> Statement for the Record, Mr. Philip A. Teel, President, Northrop Grumman Ship Systems (NGSS), Testimony Before The Senate Subcommittee on Oceans, Atmosphere, Fisheries, and Coast Guard Senate Committee On Commerce, Science and Transportation, February 14, 2007.

## Appendix F: Lockheed Martin Testimony

At a February 14, 2007, hearing on the Deepwater program before the Oceans, Atmosphere, Fisheries, and Coast Guard subcommittee of the Senate Commerce, Science and Transportation Committee, Lockheed Martin, one of the two firms involved in the joint venture that is the LSI for the Deepwater program, testified in part:

### Overview

The Integrated Deepwater System program is delivering both new and upgraded fixed wing and rotary wing aircraft; new communications systems that are making a significant contribution to improved mission performance; and, the logistics systems necessary to support fielded assets. We understand the Integrated Deepwater System will continue to evolve. To meet this ongoing challenge, Lockheed Martin is applying a disciplined system engineering approach to the program. This will continue to be vital for achieving more robust capabilities given fiscal realities - a one-asset-at-a-time recapitalization approach would be unaffordable. Lockheed Martin is committed to providing our best talent and capabilities for supporting the Coast Guard.

Lockheed Martin is primarily responsible for four Deepwater domains: System Engineering & Integration, C4ISR (the command and control network), Logistics and Aviation (refurbishment of existing assets and production of new assets). Lockheed Martin's goal is the full application of system engineering methodologies to establish the best mix of assets and introduction of new capabilities as well as implementation of the associated logistics systems. Most important is maintaining emphasis on the implementation of the Deepwater system-wide command and control network. C4ISR (Command & Control, Computers, Communications, Intelligence, Surveillance and Reconnaissance) is the network "glue" that permits various assets including ships, aircraft and shore stations to work together to more effectively and efficiently achieve a common purpose. Thus, the C4ISR domain is of particular importance as most modern civil, commercial and military systems are dependent on the value delivered by the integrating power of the network.

### Key Achievements

We are making good progress and are delivering significant new and upgraded capabilities. At the same time, we recognize the system level effects of networking are essential to achieving the level of mission performance needed by the Coast Guard. Lockheed Martin is accomplishing high rates of software re-use as well as system commonality and integration by the rigorous application of proven system engineering processes and capabilities. In addition, we are managing implementation of support systems for all Deepwater program domains. The Lockheed Martin team is working closely with our Integrated Coast Guard Systems, LLC (ICGS) joint venture partner, Northrop Grumman, to ensure that electronic equipment developed and produced under the cognizance of the C4ISR domain is appropriately configured for installation on the ships.

Every one of the Coast Guard's 12 high-endurance and 27 medium-endurance cutters have received not one but two command and control

system upgrades - giving the fleet markedly improved capability to seize drugs, interdict migrants and save lives. As for shore sites, there are a total of 12 on contract: two Communication Area Master Stations, eight Districts, one Sector and Headquarters. Use and reuse of Commercial-Off-The-Shelf, Government-Off-The Shelf and fielded maritime systems are being maximized for commonality and interoperability. The application of off-the-shelf software permits Deepwater to take advantage of the rapid changes in the commercial market place and the investments which commercial firms make in their best of class technologies. This will facilitate Coast Guard interoperability with civil and international systems, a key consideration given their mission mix.

The National Security Cutter is using 75 percent of the U.S. Navy's Open Architecture Command & Decision System. The Command & Control System for Maritime Patrol Aircraft employs more than 50 percent of the functionality of the Navy's P-3 Anti-Surface Warfare Improvement Program. The Operations Center consoles on the National Security Cutter utilize more than 70 percent of the design of the Navy's UYQ-70 display systems. Use and reuse of available software and systems is the key to commonality. In addition, this approach takes greatest advantage of the work undertaken with the Navy to establish the best Human System Interface including workspace ergonomics, viewing characteristics, input devices and overall system architecture.

The first medium-range surveillance maritime patrol aircraft, the newly designated HC-144, has been transferred to the Coast Guard. It arrived at Elizabeth City, N.C., on December 20, 2006 and is now undergoing missionization work that will be completed in April. The second aircraft was accepted by the government on January 25, 2007 and the third aircraft is in flight testing. The second aircraft will now be delivered to Elizabeth City for missionization and two crews are already in training. At the same time, we are working to complete re-engining and upgrading of HH-65 helicopters with 65 of 95 helicopters delivered to date. This project was part of the original Deepwater program plan. However, at the direction of the Coast Guard, it was rapidly accelerated due to safety of flight issues. Lockheed Martin and American Eurocopter working with the Coast Guard Aircraft Repair and Supply Center are now producing upgraded helicopters ("Charlies") that can fly faster, twice as far and with twice the payload.

Six long-range surveillance C-130J aircraft are undergoing missionization and will be delivered within 15 months after receipt of the contract with fully interoperable command, control and communications systems. The first aircraft was inducted for missionization at Greenville, S.C., on December 19, 2006. In addition, the service contract for the Helicopter Interdiction Tactical Squadron (HITRON) based in Jacksonville, Fla., has been renewed for a fifth year. These eight MH-68A helicopters are equipped with Airborne Use of Force and have had a significant impact on illicit drug interdictions. The squadron celebrated its 100th interdiction last May.

Industry's performance has been closely supervised by the Coast Guard with additional oversight from the Department of Homeland Security, the Congress and the Government Accountability Office. Each of the multiple reviews has provided constructive recommendations as requirements and funding levels continue to evolve. The results so far indicate that Deepwater has made a dramatic difference in the effectiveness of the Coast Guard with regard to the numbers of drug seizures, migrant interdictions and lives saved. Coast Guard

statistics show double-and triple-digit percent improvements as Deepwater assets and upgrades enter the fleet.

### Strategic Context of ICGS

The Deepwater program is modernizing the Coast Guard by providing new assets and expanding capabilities in aviation, ships, shore stations, logistics, and command, control and communications systems. The ICGS joint venture between Lockheed Martin and Northrop Grumman was designed as a low overhead contracting vehicle. Its purpose is to provide for rapid parsing of work between the two partners while at the same time achieving close collaboration and cooperation. It is important to note what it is not. The ICGS joint venture is not a replacement for Coast Guard decision-making. All designs and improvements are based on trade studies, analyses, and technical considerations. But make no question about it - the Coast Guard is the decision maker and contracting authority and all major acquisition decisions are reviewed and approved by Coast Guard senior leadership. ICGS utilizes the depth of capabilities and experience of its partners to provide solutions in accordance with Coast Guard requirements. The joint venture partners are utilizing more than 600 suppliers in 42 states plus the District of Columbia. In addition, ICGS maintains an active database of more than 3,000 supplier-product applications.

The Deepwater program began in 1997 as competing teams were established to develop proposed solutions for bidding the program. In fact, proposals were submitted to the government less than two weeks after 9/11. Since then, the ICGS team was awarded the Deepwater program and successfully accomplished a number of changes. Most significant were those resulting from the dramatically increased Coast Guard operating tempo in the post-9/11 environment. This means that legacy equipment began to wear out far more rapidly than had been projected. A good example is the HH-65 helicopters mentioned above. While the ICGS team's approach always included re-engining of this equipment, the original plan was to be accomplished over a longer time period. Nevertheless the team was able to process the urgent requirement for re-engining and more than two-thirds of the fleet have already been upgraded and returned to service. It is this inherent flexibility of the ICGS joint venture stemming from the deep capabilities of its partners that will facilitate our working with the new acquisition organization planned by the Coast Guard.

### The Way Ahead

Our overarching goal is to provide more capability to the fleet, sooner. We are dedicated to analyzing and recommending approaches for maximizing the value delivered to the Coast Guard, in accordance with the customer's view of value, not that of industry. This requires the best talent from each corporation. ICGS works closely with Coast Guard personnel to assure constant communications and improved working relationships. The strategic policy changes that have occurred since 9/11 must be factored into problem solving. The Coast Guard and the Department of Homeland Security have needs that can be satisfied by the Deepwater program and its approach to value delivery. The way forward will be difficult, but given the capabilities of the participants and

the strategic imperative to better outfit our Coast Guard so the safety and security of our nation is improved, the Deepwater program is eminently achievable.<sup>27</sup>

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<sup>27</sup> Testimony before the U.S. the Senate Committee on Commerce, Science, and Transportation, Oceans, Atmosphere, Fisheries and Coast Guard Subcommittee, February 14, 2007, Dr. Leo S. Mackay, Vice President and General Manager, Coast Guard Systems Lockheed Martin Maritime Systems & Sensors.